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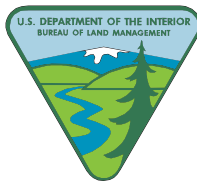
Bureau of Land Management

Arcata Field Office

and

California Department of Fish and Game

May 2002



Headwaters Forest Reserve Draft Resource Management Plan/EIS/EIR



Draft

Headwaters Forest Reserve
Draft Resource Management Plan/EIS/EIR

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Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
BLM	Bureau of Land Management
CDF	California Department of Forestry and Fire Protection's
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
dbh	diameters at breast height
DFG	Department of Fish and Game
DOI	U.S. Department of Interior
EIR	environmental impact report
EIS	environmental impact statement
EIS/EIR	environmental impact statement/environmental impact report
ESA	Endangered Species Act
ESUs	Evolutionarily Significant Units
FLPMA	Federal Land Policy and Management Act
HCP	Habitat Conservation Plan
LWD	large woody debris
MOU	memorandum of understanding
MWD	moderate woody debris
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCS	National Landscape Conservation System
NMFS	National Marine Fisheries Service
NWSRS	National Wild and Scenic River System
PALCO	Pacific Lumber Company
PWA	Pacific Watershed Associates

Reserve	Headwaters Forest Reserve
RNA	Research Natural Area
ROD	Record of Decision
RSRF	risk of stand-replacing fire
SRMA	Special Recreation Management Area
STC	Simpson Timber Company
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
WSA	Wilderness Study Area

Chapter 1. Introduction



Chapter 1. Introduction



Background

Located in the mountainous north coast region of California (figure 1-1), the Headwaters Forest was acquired by the Secretary of Interior and the State of California on March 1, 1999, to preserve the last unprotected large stand of old-growth redwood forest. Unique ecological values of the forest include

- a highly intact, functioning old-growth forest ecosystem that has very large old-growth redwood and Douglas-fir trees,
- a high diversity of plant species in the forest understory,
- nesting of threatened marbled murrelets and spotted owls, and
- undisturbed headwater stream habitat for threatened coho and chinook salmon and steelhead trout.

The federal legislation authorizing acquisition of the forest

- established a specific boundary and point of access,
- called for joint federal-state acquisition, with management by the federal government and an easement to guarantee conservation management granted to the state, and
- established the requirement for the development of a management plan.

The specific 7,472-acre tract acquired includes 3,088 acres of unharvested redwood groves surrounded by 4,384 acres of previously harvested forest and brushlands. The U.S. Department of Interior Bureau of Land Management (BLM) is charged with management of the Headwaters Forest Reserve (Reserve), and the California Department of Fish and Game (DFG) represents the state's interests in Reserve management.

Purpose of and Need for Management Plan (Project Objective)

The federal legislation authorizing the Reserve (1998 Interior Appropriations Bill) directed the Secretary of Interior to prepare a long-term management plan for its management. It established the following management goal for the plan:

“conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs.”

This document is the required management plan. It has been jointly developed by BLM and DFG to provide direction for future management actions.

The need for the plan is to assure that human activities are compatible with the ecological integrity and preservation of the Reserve’s lands, fish, wildlife, and forest. As required by the authorizing legislation (see chapter 2), the plan addresses requirements for species management, the conduct of research and monitoring activities, public access, provision of minimal facilities, and a management budget (chapter 4). In particular, it addresses watershed and forest restoration actions that are needed to protect and promote long-term ecological integrity and provide conservation management.

Planning Period and Plan Revision

This plan is intended to provide the basis for sound management of the Reserve for at least the next 10–15 years. Management must be adaptive, and stewardship of the Reserve will occur in the context of natural succession of forest characteristics and fish and wildlife use. The managing agencies recognize that the plan must be able to adapt to changing circumstances, such as new scientific information, new environmental laws, changing public demands, new management opportunities, or an addition to the Reserve (not foreseen at this time). For this reason, plan monitoring and evaluation schedules will be established as plan-implementation actions to ensure that the effects of planning decisions are tracked and reviewed on a regular basis. Evaluations will determine whether specific planning decisions remain valid or need to be revised.

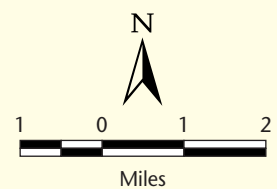
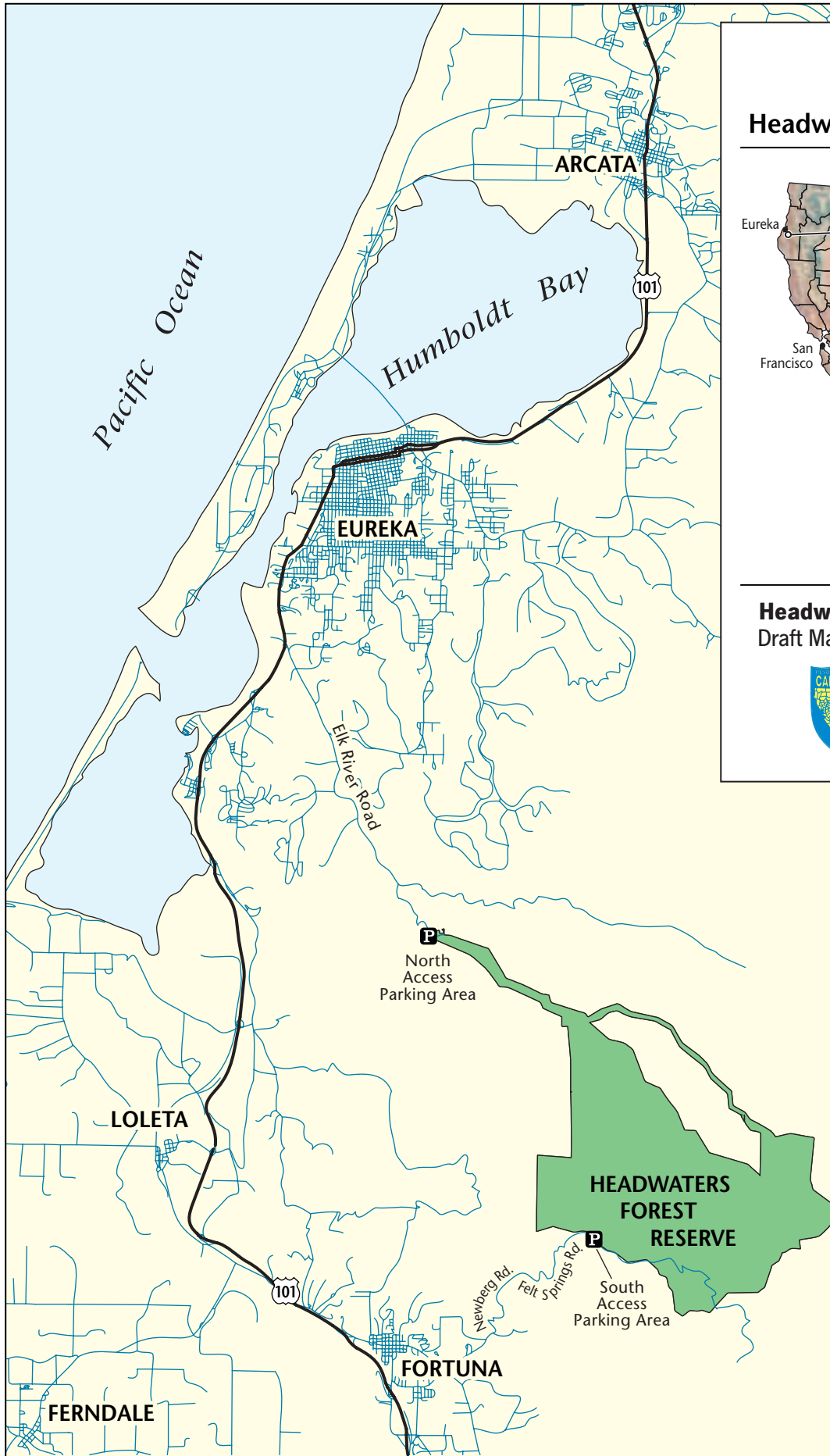
A *plan amendment* normally involves changing or adding management decisions that do not change the fundamental character of the overall plan or any of its major elements. A *plan revision* is made in response to significant new information or issues that warrant a major change in the management direction of the plan or one of its major elements. BLM planning guidelines specify that plan revisions may be considered in the following instances:

- in response to an evaluation of consistency with new laws, regulations, and policies;
- upon determination that implementing the plan’s decisions is not achieving the desired outcomes or meeting the plan’s goals;
- when new science, data, or other information indicate a need to change decisions;
- upon determination that the plan no longer provides adequate management direction; or
- when new proposals or actions not evaluated in the plan are put forth.

Figure 1-1
Location of the
Headwaters Forest Reserve



Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



Source: Bureau of Land Management

Both plan amendments and plan revisions require compliance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

NEPA/CEQA Provisions

General

NEPA and CEQA require that agencies proposing to plan or implement actions that may alter the environment evaluate potential environmental effects of such action and disclose them to decision makers and the public. If an action may result in significant adverse effects, the agency must identify feasible alternatives or planning/mitigation measures that can avoid or substantially lessen the identified impact.

This document is a joint resource management plan, environmental impact statement (EIS), and environmental impact report (EIR) that is required by NEPA and CEQA because significant adverse environmental effects could result from implementation of some land-use alternatives. This document both presents management goals and direction for long-term Reserve management and defines and evaluates alternative management approaches for specific issues identified in a public scoping process (chapter 2). The foreseeable effects of each management alternative (chapter 5) are identified and compared (chapter 6).

This document is the draft version of the resource management plan/EIS/EIR, made available for public review and comment. As required by NEPA and CEQA, comments on this draft document will be reviewed, and the document will be modified accordingly. Once a final document is prepared and statutory appeal periods have transpired, the management plan will be formally adopted and implementation will begin.

Programmatic Aspects

This document addresses future management actions at a land-use planning and program level and indicates the extent and magnitude of several types of actions, such as watershed restoration, forest restoration, and development of recreation facilities, including a trail system. Implementation of these programs will entail several years. Individual projects will be formulated, designed in detail, reviewed for potential environmental effects, modified as warranted, and implemented. Any environmental documents that must be prepared for future projects will be tiered to this document. This document provides an assessment of project effects that are generally expected to occur with program implementation, but further site-specific analysis will be conducted as necessary.

Impact Baseline and No-Action Alternative: Interim Management

The baseline for assessing benefits and impacts in this document is the current condition of the Reserve under interim management policies established by BLM in March 1999 (Federal Register 1999). Future continuation of this baseline is one of the management alternatives considered for each of the various programs governed by this plan.

Process and Required Approvals to Achieve Final Plan and Final EIS/EIR

This document is being made available for a 90-day public review period. At the close of this period, all submitted comments will be evaluated and revisions to the draft plan will be considered. Revisions that improve the ability of BLM to meet the established management goals will be adopted, and a final resource management plan and final EIS/EIR will be prepared. After allowance for final review of the plan/EIS/EIR, BLM will issue a record of decision for plan adoption and implementation, and DFG will issue a notice of determination to jointly adopt the plan.

Concurrent to this process, BLM will formally consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to obtain opinions about whether implementation of the plan is likely to jeopardize the continued existence of the several listed threatened and endangered species. This process may result in the agencies' determination that elements of the draft plan should be modified to minimize an adverse effect. Such modifications to the plan will be made to the plan before it is finalized for adoption.

Organization of This Document

This plan/EIS/EIR is composed of the following sections.

- Chapter 2, "Planning Framework," describes the legal and regulatory framework within which the plan must be formulated, as well as planning issues identified during public scoping, and planning criteria (extent of analysis, range of alternatives, and planning assumptions).
- Chapter 3, "Affected Environment (Environmental Setting) and Interim Management of the Reserve," is an analysis of current environmental conditions and the current management situation.
- Chapter 4, "Management Goals and Direction," discusses the management goals and management policy for the several program areas addressed by the plan:
 - ❑ species management,
 - ❑ watershed and forest restoration,
 - ❑ research management,
 - ❑ fire management,
 - ❑ recreation access management,
 - ❑ cultural resource management,
 - ❑ special areas designation and management,
 - ❑ resource monitoring and evaluation, and
 - ❑ management revenue.
- Chapter 5, "Management Alternatives," is a set of 10 management issues and several alternatives for resolving each of them. The management agencies' preferred alternatives are identified, as well as the alternatives for continuing the interim management policies.

- Chapter 6, “Environmental Consequences (Environmental Effects and Alternative Comparisons),” is an analysis of the effects, both beneficial and adverse, of implementation of the management goals and direction for each of the identified alternatives.
- Chapter 7, “References Cited,” includes a complete bibliography of documents cited.

Following these main sections are several appendices that support analyses and conclusions of the planning process, as well as a list of preparers, individuals and organizations receiving notice of this document, and an index.

Chapter 2. Planning Framework



Chapter 2. Planning Framework



This chapter describes the framework for management planning for the Reserve. The major elements of this framework, addressed in separate sections in this chapter, include

- existing direction for land-use planning and management (including existing requirements and guidelines for land-use planning and management, which provide the framework and point of departure for management direction articulated in chapters 4 and 5 of this plan);
- planning issues identified during the scoping process; and
- planning criteria (which include extent of analyses required, appropriate range of alternatives, and underlying assumptions needed for successful development of the management plan).

Existing Direction for Land-Use Planning and Management

This section describes existing public policy direction affecting management options and planning processes for the Reserve, as prescribed in current laws, regulations, interagency agreements, manuals and handbooks, and existing approved plans. Applicable direction includes both legal requirements and management guidelines. Legal requirements include federal–state agreements and federal and state laws and regulations adopted pursuant to those laws. Management guidelines, which are useful but are not obligatory, are derived from related resource management plans.

Legal Requirements

Reserve Legislation

In legislation authorizing the purchase of the Headwaters Forest, Congress directed the Secretary of the Interior to prepare a long-term plan for its management in consultation with the State of

California (1998 Interior Appropriations Bill). Congress established the following management goal for this plan:

“conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs.”

Additionally, Congress directed that the plan

shall guide general management of the Headwaters Forest and address the following management issues:

- scientific research on forests, fish, wildlife, and other such activities that shall be fostered and permitted on the Headwaters Forest;
- providing recreation opportunities on the Headwaters Forest;
- access to the Headwaters Forest;
- construction of minimal necessary facilities within the Headwaters Forest so as to maintain the ecological integrity of the Headwaters Forest;
- other management needs;
- an annual budget for management of the Headwaters Forest, which shall include a projected revenue schedule (such as fees for research and recreation) and projected expenses.

This legislative direction mandates a hierarchy of priorities in land management, in which resource conservation, maintenance of ecological integrity, and research are the primary purposes of creating the Reserve. Recreation, facilities development, and management needs must be subordinate to this primary purpose.

The legislation established the boundary of the Reserve and an access point at the northern end. A right-of-access to the southern portion of the Reserve was negotiated before the acquisition transaction was closed. That access was secured by grant of easement from Pacific Lumber Company (PALCO) to BLM along the Felt Springs Road, which connects to Humboldt County’s Newburg Road. The established boundary provides a direct access to the northern portion of the Reserve from Humboldt County’s Elk River Road. The acquisition legislation also required that future additions to the Reserve can only be made through federal legislative action.

State of California Conservation Easement and Memorandum of Understanding

For the State of California’s interest in the acquisition of the Reserve, the state was granted a conservation easement on February 16, 1999, to ensure that all human activities within the Reserve will be consistent with the management goal established in the enabling federal legislation (“conserve and study the land, fish, wildlife, and forests occurring on such land, while providing public recreation opportunities and other management needs” [HR 2107, Section 501]). After the conservation easement was granted, a memorandum of understanding (MOU) was signed on May 5, 1999, between the designated federal and state management agencies—BLM and DFG—and the secretary of the California Resources Agency that directs both BLM and DFG to plan and manage the Reserve for its “fish and wildlife habitat and other ecological values as full cooperating partners.”

Endangered Species Acts

The federal Endangered Species Act (ESA) provides a means for conserving ecosystems upon which endangered and threatened species depend, and it requires that federal agencies shall conserve endangered and threatened species (16 USC 1531[b,c]). The Reserve provides habitat for

- southern Oregon/northern California coasts coho salmon (*Oncorhynchus kisutch*), California coastal chinook salmon (*O. tshawytscha*) and northern California steelhead trout (*O. mykiss*), federally listed threatened species;
- marbled murrelet (*Brachyramphus marmoratus*), a federally listed threatened species and state-listed endangered species;
- northern spotted owl (*Strix occidentalis caurina*), a federally listed threatened species; and
- bald eagle (*Haliaeetus leucocephalus*), a federally listed threatened species.

Approval of the Reserve management plan is considered a major federal action that the managing agency has determined may affect these species; therefore, a consultation under Section 7 of ESA, must be completed (40 CFR 402).

The Reserve is designated as critical habitat for the marbled murrelet, coho salmon, and chinook salmon. Critical habitat is defined in ESA as a specific area within the geographical area occupied by the species that provides the physical and biological features essential to the conservation of the species. These lands may require special management consideration (USC 3[5][A]). Federal agencies, such as BLM, are required to consult with USFWS (for terrestrial or nonanadromous fish species) or NMFS (for anadromous fish species) if any actions they fund, authorize, or carry out could result in the destruction or adverse modification of critical habitat.

DFG is the management authority for the California Endangered Species Act (CESA). Species listed under CESA that find habitat at the Reserve include the marbled murrelet, as previously noted. Because DFG is also the lead agency for the state for development of this plan, it will conduct an internal consultation process to ensure that proposed elements of this plan will not disturb or adversely modify the critical habitat of the marbled murrelet.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 USC 703–711) prohibits the take of any migratory bird that crosses international boundaries. *Take* is defined as an action or attempt to “pursue, hunt, shoot, capture, collect, or kill a bird/species” and extends to any part of such a bird, its nest, or eggs. This act applies to all persons in the United States, including federal and state agencies. To help implement the act, Executive Order 13186 (January 11, 2001) requires that any project with federal involvement address impacts of federal actions on migratory birds. The order also requires that BLM develop an MOU with USFWS embodying protocols to avoid and minimize adverse impacts on migratory bird resources when the agency undertakes an action and to restore and enhance habitat of migratory birds, as practicable. Of the approximately 900 migratory birds occurring in the United States, 122 have been selected as species of management concern at a national level and 77 occur in the Reserve. Species that are confirmed to nest in the coastal redwood forest habitats of the Reserve include hermit warbler, Vaux’s swift, Swainson’s thrush, Pacific-slope flycatcher, olive-sided flycatcher, northern spotted owl, and Allen’s hummingbird (Rough pers. comm.).

The Antiquities Act of 1906 and National Historic Preservation Act

The Antiquities Act of 1906 provides protection of cultural resources on federal lands and authorizes the president of the United States to designate National Monuments. The National Historic Preservation Act (NHPA) expands protection of historic and archaeological properties to include those of national, state, or local significance and directs federal agencies to consider effects of proposed actions on properties eligible for or included in the National Register of Historic Places. It also requires proactive management of historic resources.

Listing on the National Register of Historic Places is a means of recognizing the cultural values of a historical resource. Candidate sites are evaluated and, if certain criteria are met, nominated for inclusion on the register. For the Reserve, actual designation would be agreed on by the State of California Historic Preservation Officer after BLM submits the nomination. BLM would make the determination of suitability and complete the listing. For properties that are listed, cultural resource management plans must be prepared.

NEPA and CEQA

The Department of the Interior and BLM signed an MOU with the State of California identifying the DFG as the state lead agency. As a result, the land management plan will be assessed in a joint EIS/EIR that is consistent with NEPA and CEQA. The purpose of an EIS/EIR is to ensure that decision makers are aware of the environmental consequences of a reasonable range of alternative actions. In addition, CEQA places an affirmative requirement on DFG to ensure that policy established by this plan will prevent unnecessary environmental damage, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representative plant and animal communities.

Federal Land Policy and Management Act

The Federal Land Policy and Management Act (FLPMA) (43 USC 1701–1782) describes federal policy for all lands administered by BLM. This policy requires the BLM to manage these lands to

- employ the principles of multiple use and sustained yield, except that where a tract of land has been dedicated to specific uses according to other provisions of law (e.g., the Reserve), it be managed in accordance with such law;
- protect the quality of the scientific, scenic, ecological, environmental, archaeological, and historic values;
- preserve and protect certain public lands in their natural condition (considered as areas of critical environmental concern);
- consider the relative scarcity of the values involved and the availability of alternative means and sites for realizing those values;
- provide for outdoor recreation and human occupancy and use; and
- periodically and systematically inventory and project present and future uses through a land-use planning process coordinated with other federal and state planning processes.

Management Guidelines

Management guidelines applicable to the Reserve are found in BLM's planning regulations and in four adopted resource management plans for the region or for adjoining lands.

BLM Resource Management Planning Regulations

The BLM planning process is governed by regulations established pursuant to FLPMA (43 CFR 1600) that require a comprehensive planning approach. Planning requirements are extensive and include a resource-based means of determining desired outcomes and allowable uses or needed actions to achieve the desired outcomes. These regulations are embodied in Section 1601 of BLM's land-use planning manual and section H-1601-1 of BLM's land-use planning handbook (issued November 22, 2000) (DOI BLM 2000a). They include procedural requirements for

- conducting a scoping process to determine issues and concerns;
- assessing information;
- analyzing the management situation;
- formulating desired outcomes;
- identifying allowable uses and needed actions;
- maintaining consistency with federal, state, and local policies and programs;
- coordinating evaluations with those impact assessments required under NEPA; and
- providing opportunities for public comment and participation.

The regulations require that BLM establish visual resource management zones and recreation management zones, and consider special designations for lands within the Reserve, including Area of Critical Environmental Concern (ACEC), Wilderness Study Area, and Wild and Scenic River, as well as nominations of cultural properties to the National Register of Historic Places.

Arcata Resource Area Resource Management Plan

The Reserve is within the boundaries of the BLM Arcata Field Office in northwestern California. Management of BLM lands is addressed by an existing resource management plan for the area (DOI BLM 1995a). The plan describes conservation management for a system of late-successional forest reserves, designated as ACECs. The plan does not directly apply to the Reserve, but it provides guidance in managing late-successional forest reserves within the Arcata Field Office jurisdiction to maintain and enhance ecological integrity. Enhancement activities include stand density management of previously harvested forest stands to accelerate recovery of late-successional forest communities without programmed timber harvest and watershed restoration through control of runoff and sediment production.

Northwest Forest Plan

The Record of Decision (ROD) for the *Supplemental EIS for the Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (commonly referred to as the Northwest Forest Plan) (U.S. Forest Service and U.S.

Department of Interior Bureau of Land Management 1994) amends the current land management plan for the Arcata Resource Area. An amendment to the Northwest Forest Plan in 2001 specifically exempts the Reserve from requirements of the ROD (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Several standards and guidelines of the Northwest Forest Plan are relevant to the Reserve and will be adopted in this plan. They include the Aquatic Conservation Strategy and the guidelines for managing designated *Survey-and-Manage species*. These guidelines are adopted for the Reserve because they are directed at maintenance of ecological integrity in Pacific Northwest ecosystems, and they have been developed with the best available science, reviewed by the public, and approved by the Secretaries of the Interior and Agriculture.

Threatened or Endangered Species Recovery Plans

Recovery plans, authorized under the ESA (16 USC 1533), describe goals and objectives and provide direction necessary to aid species recovery, so that species might be removed from the threatened or endangered lists. A recovery plan adopted by USFWS for the marbled murrelet is available. Recovery plans for the listed fish species are currently being developed by NMFS.

Northern Spotted Owl

The Northwest Forest Plan provides the federal contribution to the recovery of the northern spotted owl. Accordingly, the plan for the Reserve should be consistent with the Northwest Forest Plan, providing equal or higher level protection for northern spotted owl and its habitat.

Marbled Murrelet

The Reserve is in the Siskiyou-Coast Range recovery zone (Zone 4) that is identified for the marbled murrelet (U. S. Fish and Wildlife Service 1997). The importance of nesting habitat in the Reserve was recognized by USFWS when the lands were owned by PALCO. Maintenance of suitable habitat is considered critical to avoid widening the gap in the distribution of the species between Humboldt County and central California (San Mateo County). Recovery of the species requires short-term actions to stop the species' rapid population decline and long-term actions to cultivate mature forest habitat. Management actions in Zone 4, which includes the Reserve, should focus on preventing the loss of occupied nesting habitat, minimizing the loss of unoccupied nesting habitat, and decreasing the time required for the development of new suitable habitat. Additionally, development of or modification to recreation facilities near marbled murrelet habitat should be evaluated to minimize disturbance and reduce the attraction of corvids (crows and jays) that might prey on murrelets.

Pacific Lumber Company's Habitat Conservation Plan

As a part of the Headwaters transaction, PALCO agreed to manage the remainder of its lands under a Habitat Conservation Plan (HCP), pursuant to provisions of the ESA. The established HCP applies to PALCO's lands adjacent to the Reserve but not to the Reserve itself (PALCO 1999). The requirements for the conservation of species that apply to PALCO's lands provide management guidelines that may be applicable to the Reserve as well. Relevant restrictions have been embodied in the "Species Management" section of chapter 4. In addition, the monitoring

element of the management plan for the Reserve should be coordinated with the monitoring requirement of the HCP, to the benefit of BLM, DFG, and PALCO. Some of the protocols established in the HCP require monitoring of undisturbed ecosystems within the Reserve.

National Landscape Conservation System

The Reserve is a unit of the National Landscape Conservation System (NLCS). BLM created the NLCS in 2000 to place more emphasis on the conservation of specific intact western landscapes. Units in this system must be managed consistently with their underlying authority, which is HR 2107 for the Reserve. Each unit will have its own land-use plan established. Multiple-use activities are appropriate as directed by the authorizing legislation or executive order or as determined through a management plan; however, efforts are to be made to locate major recreation or interpretive facilities in gateway communities. Visitor contact and information facilities should be located outside of these units where appropriate. Roads and trails are appropriate when needed for a specific management purpose or to access some destination or development.

Planning Issues

A planning issue is a point of concern over resource management activities or land use that may be resolved or addressed in alternative ways. The decisions made by this plan are intended to resolve issues that arise from public input and resource monitoring and to implement federal and state statutory, regulatory, and policy mandates.

A public scoping process for preparation of the management plan and related environmental impact assessment was conducted from May 18, 2000 to August 18, 2000. Public and agency input was solicited through three public meetings (in Eureka, San Francisco, and Sacramento), use of a web site offering information and electronic comment input, establishment of dedicated telephone lines for information requests and comment input, and provisions for submission of written comments by mail. A summary of the comments received was compiled (Jones & Stokes 2000).

Issues to Be Addressed

Major issues identified include

- means of balancing preservation of old-growth ecosystems and threatened and endangered species that occupy them with public recreation access, considering the extent of trail access to or within old-growth groves that may be appropriate, and the appropriate types of trail use (i.e., walking, hiking, biking, and equestrian);
- management of traffic impacts to local residents along the two county roads providing public access to the Reserve;
- appropriate level of watershed restoration via road and log-landing decommissioning throughout the harvested portions of the Reserve to improve aquatic habitat conditions;

- appropriate level of forest restoration of harvested stands to accelerate recovery of old-growth characteristics; and
- access for the disabled and elderly to old-growth forest.

Issues Dismissed

Some of the issues identified by the public during the scoping process are not appropriate matters to be addressed in the management plan. These include the following issues.

- **Acquisition of additional lands.** BLM and DFG have concluded that the legislation authorizing Reserve acquisition intends that the management plan address management of the acquired lands consistent with existing land ownership.
- **Development of alternative or supplemental access routes.** BLM and DFG have concluded that the legislation authorizing the Reserve intends that the plan address management of access along the two existing access routes that were acquired in the acquisition transaction.
- **Development of a regional trail system.** The planning process will not involve design of a regional trail system involving other lands not included in the acquisition.

Planning Criteria

Planning criteria are the ground rules that guide the development of the plan and the planning alternatives. They are based on standards prescribed by applicable laws and regulations; agency guidance; coordination with the public; coordination with other federal, state, and local agencies and Indian tribes; and professional judgement. Planning criteria include

- the extent of analyses needed to support planning decisions,
- the range of alternatives needed to explore means to balance preservation and utilization needs and interests, and
- underlying planning assumptions.

Extent of Analysis

The plan will be formulated in response to the Congressional requirement for preparation of a long-term management plan for the newly acquired Reserve. The analyses needed for formulating the plan and assessing management effects requires that information be compiled in the realms of

- topography, stream network, and existing road system;
- geology and soils;
- water quality and sources of sediment delivery to streams;
- vegetation types and seral stages (ecological communities formed in ecological succession);
- fire and timber harvest histories;

- fisheries and extent of anadromy;
- wildlife occurrences and habitat requirements;
- cultural resources;
- emerging recreation use, recreation needs, and recreation opportunities; and
- research and monitoring needs.

Such information has been compiled by several means. Before and after public acquisition of the Reserve, several studies were conducted that provide part of the foundation for this plan and for interim management actions before the plan is adopted. These studies, to date, are listed below.

- **Vegetation mapping and classification of the Reserve delineating plant associations and seral stages.** Mapping was compiled through extensive ground surveys of vegetation polygons derived from detailed aerial photographic analysis. Stand types were identified and new stand descriptions were developed from 59 field plots. Ten plant associations were identified in mature and old-growth stands. Harvested lands were subdivided into 13 seral stages. The study results were entered into a geographical information systems (GIS) layer. (Jimerson and Jones 2000)
- **Surveys of occurrences of marbled murrelet and northern spotted owls.** Known northern spotted owl sites were surveyed by BLM in 2000 according to USFWS-approved protocol. Suitable marbled murrelet habitat was surveyed according to approved protocol by Redwood Sciences Laboratory and PALCO from 1991–1997. Survey results were entered into GIS layers and analyzed in Ralph et al. (1997).
- **Surveys of the range of anadromy in streams draining the Reserve.** These surveys, obtained from PALCO with minor modifications by local professionals and field checks by BLM and Humboldt State University staff, established the range of coho salmon and steelhead in the Salmon Creek and Elk River watersheds within the Reserve and on adjacent lands.
- **Surveys of Survey-and-Manage species as defined by the Northwest Forest Plan.** Surveys of Survey-and-Manage lichen and fungi were conducted using field plots (McFarland and Largent 2000). Localized survey information for Survey-and-Manage wildlife has been collected through predisturbance surveys at watershed restoration sites.
 - aquatic herptofauna—systematic sampling of all aquatic habitats in the Reserve was conducted to determine the presence and distribution of aquatic reptiles and amphibians. A report is expected in spring 2002.
 - aquatic macroinvertebrates—systematic sampling of all aquatic habitats in the Reserve was conducted to determine the presence and distribution of aquatic macroinvertebrates. Species identification in BLM’s National Aquatic Monitoring Center is ongoing. A report is expected in spring 2002.
- **Watershed restoration plans for major portions of the Reserve.** These documents include identification of all recognizable current and future sediment sources from roads within the Salmon Creek watershed, a plan and cost estimate for topographic restoration of the Headwaters Old-Growth Road, and an erosion inventory of several roads within the Elkhead Springs unit (PWA 2000a, 2000b). These plans, in conjunction with an approved management plan and EIS/EIR, will contain the elements of watershed analysis required by the Northwest Forest Plan.
- **A cost estimate for road decommissioning throughout the Reserve.** The study includes review of the Pacific Watershed Associates 2000 erosion site inventories; a sample inventory

of former logging roads in the lower Little South Fork Elk River and Elkhead Springs areas; development of average unit costs for two levels of restoration (hydrologic stabilization and full recontour) for each subwatershed in the Reserve; and development of a GIS layer showing the locations of inventoried roads and landings. (PWA 2001)

- **An inventory of recreation use and recreation use attitudes.** This study consisted of two parts. The first part is result of a recreation survey conducted at the Elk River Trailhead in 2000. This study assessed frequency and intensity of use and attitudes toward use of the Reserve. The second part is a mail-out survey assessing attitudes of prospective users. (Humboldt State University Academic Foundation 2000, Humboldt State University Academic Foundation 2001)
- **A cultural resource inventory of the Reserve.** Pursuant to Section 110 of the NHPA, a cultural resources survey of the Reserve was initiated by BLM in 2000 and conducted by Humboldt State University Foundation (HSUF) under a cooperative agreement. The survey consisted of a formal records search, archival research, oral history interviews, a systematic archaeological field survey, formal recording of sites, mapping and photo-documenting discovered resources, developing a GIS cultural resources layer, conducting preliminary site-significance assessments, developing management recommendations, and preparing a report (Humboldt State University Academic Foundation 2001).

In addition to these sources of information, the following planning analyses have been conducted by BLM staff and their planning consultants:

- compilation of a detailed geologic map of the Reserve;
- assessment of the fire history of the Reserve;
- compilation of timber harvest history of the Reserve;
- evaluation of the effects of density management of forest species on the growth and development of second-growth stands;
- evaluation of potential trail routes in the Reserve, based on terrain characteristics;
- assessment of regional recreational needs and opportunities, by recreation type;
- evaluation of the experience of shared trail use among hikers, bicyclists, and equestrians;
- assessment of disturbance factors for marbled murrelets and spotted owls;
- analysis of effects of human activities on the attraction of scavenger bird species (i.e., corvids);
- analysis of effects of horse presence and horse waste products on spread of pathogens or nonnative plants; and
- review of recent experience of the recreational fee demonstration program for federal lands and the state park fees program.

The studies and analyses noted above provide a sound basis for formulation of the management plan and evaluation of planning alternatives as required by NEPA and CEQA and BLM's planning guidelines.

Range of Alternatives

The range of alternatives must accommodate the range of reasonable management strategies that could resolve the identified public issues and management concerns for management of the Reserve. These issues and concerns were discussed in the preceding section.

All of the alternatives considered in detail must be consistent with the overriding purpose for which the Reserve was created—the protection and restoration of old-growth and aquatic ecosystems. The need for this focus was described in the “Existing Planning Direction” section above. Consistent with the identified issues and concerns and the overriding purpose of the Reserve, alternatives for Reserve management must be formulated for

- intensity of watershed restoration, ranging from no restoration, in addition to that previously approved through 2002, to full stabilization and recontouring to natural topography of all sites contributing, or likely to contribute, sediment to the Reserve’s streams;
- intensity of forest restoration, ranging from no forest restoration and complete reliance upon natural recovery of harvested stands, to moderately intense tree density management to nurture more rapid recovery of old-growth characteristics;
- availability of the southern access to the public, ranging from no access to individual automobile access at visitors’ discretion, and including the interim alternative of guided access;
- extent of trail access throughout the Reserve, ranging from limiting public access to riparian corridors away from old-growth groves, to extensive passage through old-growth groves in the nonnesting season for marbled murrelets and spotted owls;
- nature of trail use, ranging from no use by bicyclists and equestrians to extensive use where trail conditions are appropriate, support facilities can reasonably be provided, and user conflicts can be minimized;
- potential special-area designations for some or all of the Reserve, including Area of Critical Environmental Concern, Research Natural Area, Wilderness Study Area, Wild and Scenic River System, and State of California Ecological Reserve; and
- use of access fees, ranging from no fee to a universal fee or an in-lieu donation of labor to help maintain the Reserve.

Within the ranges noted above, intermediate alternatives must also be formulated to provide potential means for balancing competing needs and interests.

Planning Assumptions

Several assumptions underlie the planning process; they are listed below. The basis for some of these assumptions was previously described; others are set forth here to illuminate intent in formulating elements of the plan.

- The plan will be consistent with the various existing authorities described in the “Existing Direction for Land-Use Planning and Management” section at the beginning of this chapter.
- The plan will be based on the information, analysis, and range of alternatives described above.

- The Reserve will be primarily managed to protect and help recover populations of threatened and endangered species, with primary focus on marbled murrelet, northern spotted owl, coho salmon, chinook salmon, and steelhead, which are known to inhabit the Reserve. The Reserve will be managed to be available to protect and help recover any additional threatened or endangered species of old-growth ecosystems that may become listed in the future.
- The plan will promote a program of scientific research and resource monitoring for the Reserve, consistent with the preservation purpose for which the Reserve was created and to expand the current knowledge of the Reserve's resources.
- Recreational activities allowed in the Reserve will be those that foster education and interpretation of the Reserve's unique biological resources, maintain ecological integrity, and can be supported with minimal necessary facilities.
- The extent of the Reserve and access routes to the Reserve have been firmly established by Congress. No new access routes to the Reserve or land addition to the Reserve will be considered in plan formulation or recommended in the management direction established by the plan.
- A regional trail system will not be developed as a part of this plan.
- Public vehicle use will not be allowed in the Reserve.
- Fire management in the Reserve will be conducted consistent with the unique old-growth values of the Reserve, and fuel treatment and fire suppression strategies will differ between old-growth forests and second-growth, recovering stands.
- Evaluations of suitability for Wilderness Study Areas, inclusion in the Wild and Scenic River System, or designation as a State of California Ecological Reserve will be conducted as part of plan formulation, and recommendations for such designations may be part of the management direction established by the plan.

Chapter 3. Affected Environment (Environmental Setting) and Interim Management of the Reserve



Chapter 3. Affected Environment (Environmental Setting) and Interim Management of the Reserve



Physical Environment

Location

The 7,400-acre Reserve is located in the northwestern Coast Ranges of California near Humboldt Bay in Humboldt County (figure 1-1), part of California's north coast region. It is reached year round by Elk River Road from the city of Eureka (6 miles) or seasonally for BLM tours by the Newburg Road from the town of Fortuna (4 miles). These two-lane rural county roads connect to U.S. 101, which links the San Francisco Bay Area to the Eureka Bay area. The Reserve is located in rugged upland terrain, extending over two sets of parallel ridges and drainages (figure 3-1). It includes the headwaters of three streams: South Fork Elk River, Little South Fork Elk River, and Salmon Creek (figure 3-2). The entire Reserve drains to Humboldt Bay.

Climate

Climate in the 100- to 1,500-foot-elevation valleys and ranges comprising the Reserve is typically characterized by cool, wet, maritime atmospheric conditions with rainy winters and cool to warm, cloudy or foggy, low-precipitation summers. Annual precipitation at the Reserve is estimated to be 39 inches, mostly in the form of rain, although snowfall occasionally occurs. Fog drip is common in summer and ameliorates harsh summer temperatures and moisture extremes during critically dry periods. Temperature ranges at the Reserve are moderated by proximity to the Pacific Ocean. Average monthly highs at Eureka range from 61.5 °F in summer to 54.8 °F in winter. Lows range from 52 °F in summer to 42.1 °F in winter. Wind is highly variable, but

prevailing westerlies from the Pacific Ocean in summer and southwesterly flow during cyclonic storms in winter are typical and bring humid conditions. Periodically, however, easterly wind from the hot interior of California creates dry conditions for multi-day periods in summer or fall.

As with all of California, precipitation tends to vary substantially from year to year in response to global atmospheric and oceanic conditions. Annual precipitation has ranged from 18 to 74 inches in Eureka. El Nino conditions bring a wetter, longer rainy season, and La Nina conditions bring low rainfall. Sequences of both dry and wet years have been observed historically, and longer such sequences have been inferred from paleoclimatological studies. During the summers of drought periods, offshore wind can create very dry conditions in the Reserve's forests.

Geology and Soils

Two main types of rocks occur in the Reserve—the older and more resistant sedimentary rocks of the Yager Formation and a sequence of geologically younger rocks known as the Wildcat Group. The Yager and Wildcat rock units can be viewed as two distinct units—an underlying hard “basement” (the Yager Formation) overlain by a mantle of softer younger rocks (the Wildcat Group). The older Yager rocks are well cemented and resistant to erosion while the Wildcat rocks are very soft, weakly cemented, and very susceptible to erosion. The Wildcat Group typically underlies most of the forested areas and upper slopes within the Reserve, and the Yager Formation is only exposed in the stream bottoms and inner gorges of the main tributaries (figure 3-2). (DOI BLM 1999b, 2000; Ogle 1953; Kilbourne 1985; Kilbourne and Morrison 1985)

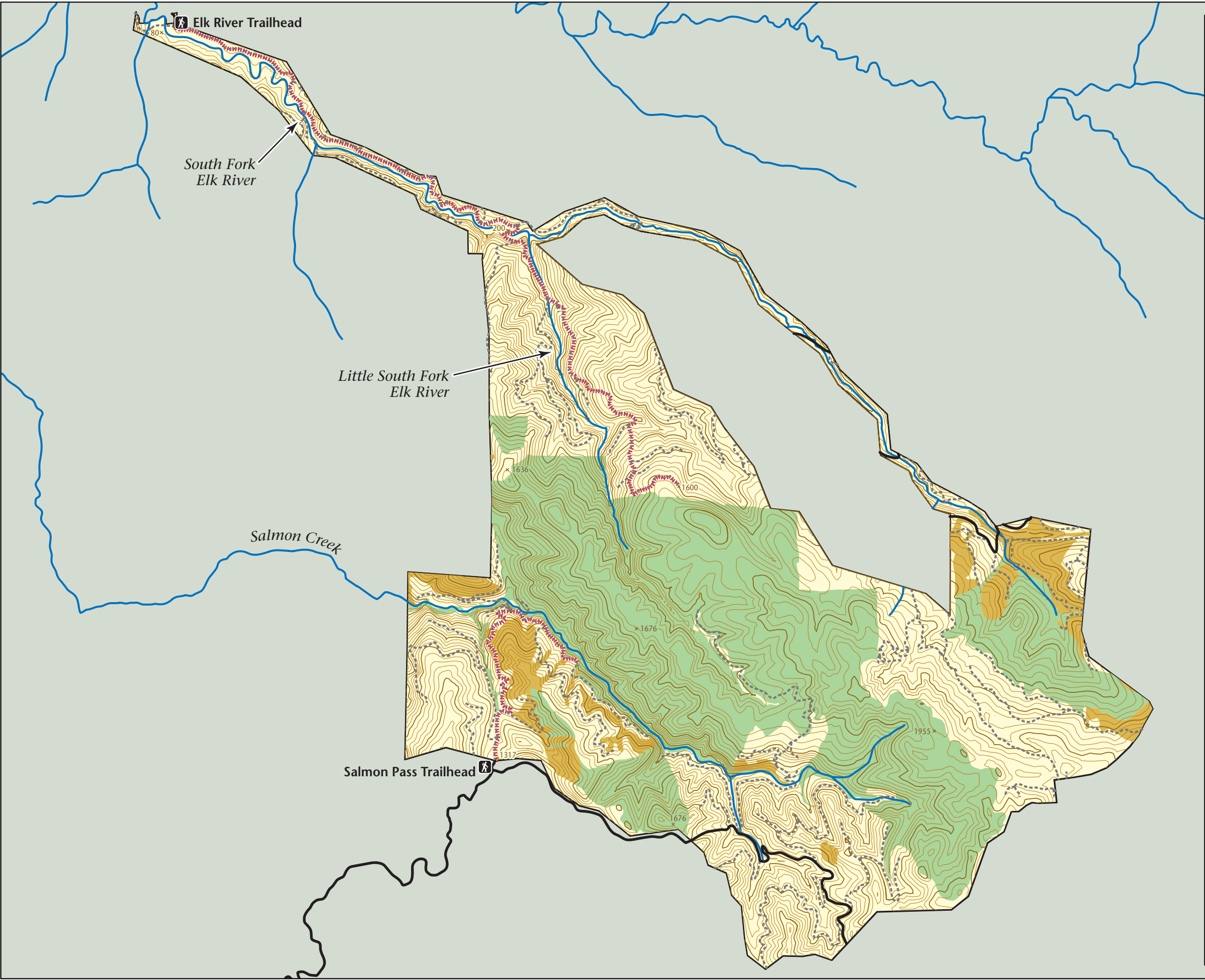
Stream channel deposits derived from the Yager Formation are typically composed of hard sandstone and conglomerate pebbles, cobbles, and boulders, with smaller amounts of sand and silt. Soils formed from the Yager sediments have abundant rock fragments and sand components and the soils are well drained and moderately resistant to erosion.

The Wildcat Group is composed of soft, poorly consolidated marine sandstones, siltstones, and claystones. All these rocks are weakly cemented, highly erodible, and prone to slope movement, and small streamside landslides are especially common on these younger rocks within the Elk River and Salmon Creek watersheds. These landslides are most often caused by streambank erosion, which destabilizes oversteepened hill slopes in stream corridors. The soft rocks of the Wildcat are also easily eroded and broken down into their fine components—sand, silt, and clay. The Wildcat rocks are the most susceptible to surface or sheet erosion where rock exposures lack vegetative cover, especially along recently built logging roads, landings, and skid trail networks. Fine sediments from these exposed unvegetated areas are transported during rainstorms and are eventually deposited in streams.

Based on past geologic reports and recent field inventories of potential erosion sites, future erosion and sediment delivery to streams within the Reserve can be expected to be highest for rocks of the Wildcat Group. These rocks are the dominant rock types in the Reserve, the most easily eroded, and the most susceptible to fill failures.

Most of the past logging and road building activities within the Reserve have taken place on rocks of the Wildcat Group. Old roads and landings along the inner gorge area of the South Fork of Elk River, and roads and landings located just upslope of the inner gorge in the Salmon Creek drainage pose the highest risks of failure in the near future. The most serious erosion hazards are abandoned stream crossings on roads and road fill perched over stream channels. These erosion hazards have a high potential to deliver large amounts of sediment directly into streams, which would result in damage to aquatic habitat.

Figure 3-1
General Characteristics
of the Headwaters Forest Reserve



- Legend**
- Reserve Boundary
 - Perennial Streams
 - Permanent Roads
 - Abandoned Roads
 - Existing Trails
 - Trailheads
 - Topographic Contours (40-foot interval)
 - Spot elevations
- Vegetation Types**
- Unharvested Forest
 - Seed-Tree Harvested Forest (Old-Growth Remnants)
 - Other Harvested Forest

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR

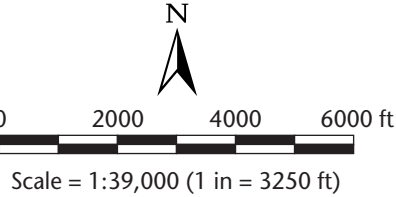
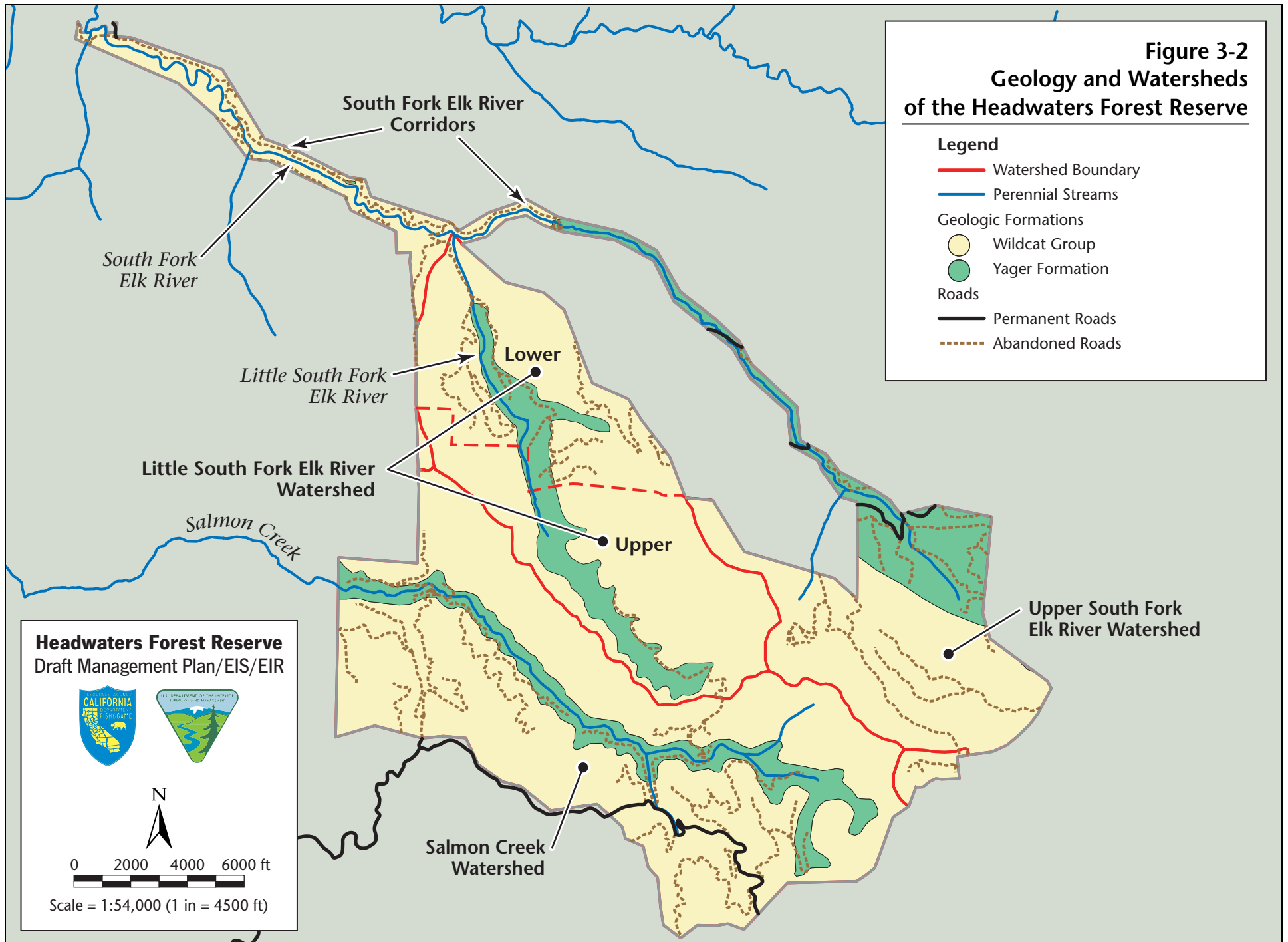


Figure 3-2
Geology and Watersheds
of the Headwaters Forest Reserve



Soils developing on the rock units within the Reserve (loams to clay loams of the Larabee and Hugo Series) have good nutrient availability, moisture holding capacity, and fertility. They are capable of producing substantial forest biomass where slopes are stable and soil surfaces are protected from raindrop impact and runoff. In areas of past logging, even where soil has been highly disturbed, the Wildcat derived soils generate new vegetation quickly. The soft rocks break down quickly into soil size particles, and the numerous fractures and unconsolidated character of the rock allow roots to penetrate easily. The Wildcat siltstones and claystones hold water for long periods of time, allowing for better regrowth of vegetation and a rapid recovery of landslide and erosion sites.

Minerals

Locatable mineral potential within the Reserve is very low. Potential for oil and gas reserve is moderate. There are existing oil and gas leases within the southwest corner of the Reserve. The federal government retains one-half of the mineral interest in the original Pacific Lumber Company lands now within the Reserve, with the remaining interest subject to a proposed purchase into federal ownership. The mineral estate for lands previously held by Elk River Timber Company are entirely in federal ownership.

Social Environment

Adjacent Land Use

Lands adjacent to the Reserve are predominantly commercial timberlands, owned and managed for timber production by the Pacific Lumber Company (PALCO) and Simpson Timber Company (STC). Timber harvests are presently taking place or are planned on lands near the Reserve.

Lands along Elk River Road, from the edge of Eureka to the northwest tip of the Reserve at the Reserve's Elk River Trailhead, are in rural residential use. Lands along the Newburg Road from Fortuna to the edge of PALCO's forests are also in rural residential use, with homes closely bordering the roadway. At the end of the Newburg Road, a locked gate prevents unauthorized access onto Felt Springs Road, which is a log-haul road owned and maintained by PALCO. Felt Springs Road accesses the southern boundary ridge and traverses the southeastern portion of the Reserve to adjoining timberlands. An easement granted to BLM secures a restricted public right of access by motor vehicle along this road, which is regulated by BLM.

Timber Management History

The Reserve's watersheds are typical of the north coast region where intensive management of the land for timber production has occurred over the last four decades or longer (figure 3-3), although logging began in the Reserve in the late 1800s. Until 1999, the upper Salmon Creek, upper South Fork Elk River (Elkhead Springs area), and upper Little South Fork Elk River watersheds were owned and managed for forest product production by PALCO, and the lower Little South Fork watershed and South Fork Elk River corridor were under the ownership of Elk River Timber Company. In 1999, private timberlands in both areas were transferred to the Secretary of Interior for preservation purposes and now comprise the Reserve.

PALCO lands in the upper Salmon Creek watershed remained uncut and unroaded through the 1960s. In the mid- to late 1970s, more than approximately 500 acres in the headwaters of Salmon Creek were roaded for timber access, and some areas along the roads were harvested. By 1981, several hundred acres of land just upstream from the adjoining STC property had been shelterwood or seed-tree harvested and tractor yarded. Although these harvests represented the first entry in the upper Salmon Creek watershed, much of the upper watershed still remained in a natural condition.

By 1987, some new road construction, road reconstruction, and about 40 acres of clear-cutting had occurred in the upper Salmon Creek basin. In the early 1990s, a road was constructed over the divide from the Salmon Creek watershed into the headwaters of the Little South Fork Elk River. Along with approximately 1.5 miles of road construction, about 15 acres of old-growth redwood forest was harvested along the road alignment. Between 1987 and 1994, harvesting (mostly by tractor yarding) and road construction continued on PALCO lands, and perhaps half or more of the upper Salmon Creek watershed was harvested. From 1994 to 1999 some additional road reconstruction and upgrading was performed on PALCO lands in the upper basin, but by then, roading and harvesting had been significantly curtailed over the entire area.

By 1974, road construction and timber harvesting occurred in the lower Little South Fork Elk River watershed. Most of the lower lands in this watershed were clearcut with tractor yarding and are composed of second-growth forest. Subsequent road entries were made as recently as the 1990s, when the upper portion of this watershed was clearcut.

The Upper South Fork River watershed (Elk Head Springs area) has been entered for timber harvesting at several different times. Logging haul roads were built in the 1970s, and the upper area was harvested at that time. The eastern part of the watershed was clearcut with tractor yarding in the 1980s, but the majority of the watershed was only partially harvested at that time. Between 1987 and 1994, the areas that had been partially harvested were clearcut.

Biological Resources

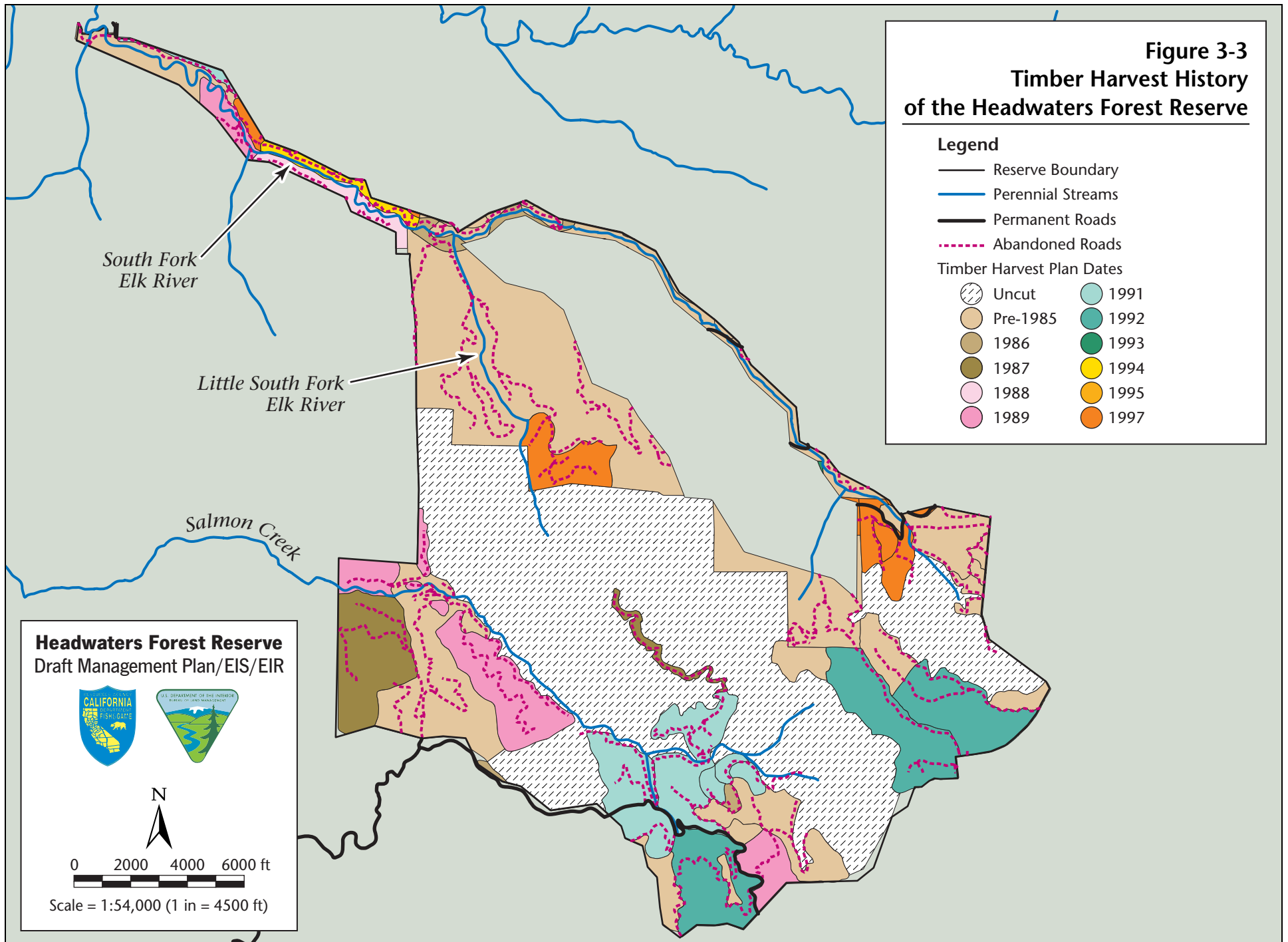
Watershed and Aquatic Habitat Conditions

General Watershed Conditions

Approximately 60% of the Reserve (4,400 acres) was entered for timber harvest prior to its designation as a Reserve. This harvesting required the development of over 35 miles of roads (figure 3-1), widened periodically to serve as log landings, and the falling, skidding, and removal of large forest trees. Nearly 9% of the harvested area was disturbed for roads and landings, which included 122 stream crossings (figure 4-1). An estimated 49 major road-induced landslides are now present (PWA 2001). Except for some locations where various selection harvest methods were employed (i.e., *seed-tree harvested* areas), forest canopies were completely removed in harvested areas (clearcut). Overall, the entry for timber harvest significantly degraded watershed conditions in terms of its ability to intercept, store, delay, and filter runoff. The unharvested portion of the Reserve (3,000 acres), however, comprises a dense old-growth forest and exhibits pristine watershed conditions.

Because most of the Reserve was harvested by tractor logging, most of the log haul roads were placed near streams (because logs must be dragged downhill). Direct rainfall and concentrated runoff entrain sediment from road and landing surfaces and generally deliver it directly to nearby

Figure 3-3
Timber Harvest History
of the Headwaters Forest Reserve



streams. In many locations, gullies form where runoff is concentrated, further increasing sediment generation, or saturated road and landing fills fail directly into streams. Where roads cross the numerous streams on the Reserve, culverts or “Humboldt crossings” (logs placed in the stream parallel to streamflow) were installed. As these roads have not been maintained for several years, many of these stream crossings have become plugged. Plugged culverts can impound runoff and subsequently erode large sections of roadbeds, delivering additional sediment to the stream system. The relationship of road systems to stream sedimentation has been well documented (Furniss et al. 1991, Amaranthus et al. 1985, Reid and Dunne 1984, Beschta 1978, Megahan and Kidd 1972, Brown and Krygier 1971).

Skid trails are also extensive within the Reserve. Most of the older skid trails have revegetated, while most of the more recent ones are still very visible. The headwaters of the South Fork Elk River (Elkhead Springs area) has the highest density of skid trails in the Reserve; one area has 94 miles of skid trail per square mile of land. In some cases, skid trails divert water onto exposed soils or unstable areas, which results in additional surface erosion or mass failure, both contributing additional sediment to streams.

Sediment sources in the Reserve, as well as potential plans for watershed restoration, have been addressed by Pacific Watershed Associates (PWA) in three reports (2000a, 2000b, 2001). Much of the data in this section is taken from the PWA inventories.

General Aquatic Habitat Conditions

Aquatic habitats in the Reserve include the headwaters of Salmon Creek, approximately five miles of the South Fork Elk River, including its headwaters at Elkhead Springs, and the entire Little South Fork Elk River. South Fork Elk River supports coho salmon, chinook salmon, steelhead, and cutthroat trout within the Reserve boundaries. The lower 0.25 mile of Little South Fork Elk River also supports both salmon and steelhead, but a barrier prevents migration into the upper reaches of the drainage (figure 3-5). In the Reserve, Salmon Creek does not now support anadromous runs of these species, but they are present downstream of the Reserve. Migration barriers may be preventing access to the Reserve (non-anadromous cutthroat trout are found within the Reserve). These streams also support resident rainbow trout, sculpin, and threespine stickleback.

All of these streams are well shaded, have cold water temperatures, and have ample large woody debris within the stream channels. Within the Reserve boundaries, the temperature of Salmon Creek never exceeds 60° F, and temperature of Little South Fork Elk River appears to remain below 65° F in summer. Salmon Creek has numerous deep pools with a large amount of large woody debris where it passes through old-growth forest. However, fine sediment (silt) covers channel-bottom substrates. South Fork Elk River contains many pools, some of which are deep, but it contains large amounts of fine sediment as well. South Fork Elk River (including the Little South Fork) appears to carry high sediment loads during the rainy season. Sediment introduced into all three streams has most likely decreased the size and depth of many pools relative to the unharvested condition, tending to somewhat elevate water temperatures (Fuller pers. comm.).

Fine sediment observed in all of these streams is sufficient to

- inhibit salmon from digging spawning redds (nests),
- limit water flow through the redds (which can cause eggs or newly hatched fish to suffocate),
- inhibit newly hatched fish escape from spawning gravel,

- limit primary photosynthetic production,
- depress benthic invertebrate abundance, and
- increase gill erosion.

Conditions within Specific Watersheds

Upper Little South Fork Elk River Watershed

The 1,500-acre upper Little South Fork Elk River watershed is almost entirely covered with unharvested, old-growth forest. This heavily vegetated, undisturbed watershed produces high-quality streamflow to help maintain suitable aquatic habitat conditions in the downstream reaches of the South Fork Elk River. Sediment loads are relatively small, and aquatic habitats are generally in pristine condition. The watershed was penetrated by a single logging road near the end of the timber harvesting era (referred to herein as the *Headwaters Old-Growth Road*). This 0.9-mile road with three stream crossings was partially decommissioned and recontoured in August–September 2000, following an environmental assessment (DOI BLM 2000) and is expected to be fully decommissioned by 2002.

Lower Little South Fork Elk River Watershed

This steep watershed includes 1,200 acres of harvested lands tributary to the Little South Fork Elk River from its confluence with the South Fork upstream to the northern edge of the main Headwaters Forest grove (1.6 miles). The mainstem channel has a steep gradient, limiting anadromy to the lower quarter mile as noted. This area has nearly 10 miles of logging roads that have 20 stream crossings and an estimated eight landslides. The main road accessing the harvested lands from the Elk River corridor is used as a trail, but it is poorly routed for continued use, requiring high maintenance. Forest cover has begun to dominate much of the area: 77% of its second-growth forest has already reached or exceeded early-mature forest stage. Fine sediment is abundant in the stream channel.

Salmon Creek Watershed

The 3,000-acre Salmon Creek drainage encompasses the entire south end of the Reserve. The Reserve contains all of the headwaters of the stream. The main stem flows for nearly two miles through unharvested old-growth forest, where it is isolated from harvested areas in southern portions of the watershed by a streamside corridor of old-growth forest. Although the Salmon Creek watershed contains up to one-third of the old-growth forest in the Reserve, 65% of the watershed acreage has been heavily roaded and logged. Nearly 15 miles of abandoned logging roads with 50 stream crossings are present. As a result, numerous roads and landings are in inner gorge locations, perched above the streams and episodically contribute massive amounts of sediment to the Salmon Creek system. Twenty-two road-related landslides are present. As previously noted, channel-bottom sediment is extensive. Industrial forest lands downstream of the Reserve, where salmon and steelhead are found, have recently initiated road decommissioning. Roads directly adjacent to Salmon Creek within the Reserve are in the process of being removed (late summers of 2000 and 2001).

Upper South Fork Elk River Watershed (Elkhead Springs Area)

Reserve lands comprise approximately 1,100 acres of the 1,300-acre headwaters of the South Fork Elk River (85%). Only 400 acres, or 31%, of this watershed has unharvested old-growth forest. Harvested areas (69% of the watershed) contain many roads (an estimated 9.6 miles of roads with 48 stream crossings and eight landslides). These areas are recently harvested and contribute significant sediment to the river and its tributaries, which are occupied anadromous fish habitat. This watershed had highest densities of roads and upslope diversions of runoff within the Reserve. Fine sediment is abundant in the river channel.

South Fork Elk River Corridors

These two South Fork Elk River corridors (from the Elk River trailhead to slightly downstream of the confluence with the Little South Fork, and from the confluence upstream to the Elkhead Springs area) comprise narrow parcels of public land along the South Fork Elk River. The width of the downstream corridor averages nearly 0.2 mile (700–1,200 feet); width of the upper corridor averages less than 0.1 miles (300–500 feet). Much of the corridor land supports mountain riparian forest. Conifer forests within the corridors were harvested for timber, and second- and third-growth stands have replaced them. Lands in the tributary watersheds, except for the Reserve's Elkhead Springs area previously described, have been and continue to be managed for timber production under an approved HCP. Management of the Reserve's upland watersheds will therefore have only a limited effect on the extensive fine sediment and existing anadromy in the corridor reach of the river. Appropriate watershed restoration within the corridor would be limited to controlling erosion and stability of the Elk River Road, a former logging haul route that now serves as the primary trail into the northern portion of the Reserve. This road presently requires a high level of maintenance due to erosive substrate and location adjacent to river.

Forest Vegetation

The natural vegetation of the Reserve is coniferous forest, dominated by coastal redwood. Douglas-fir (on northerly slopes) and tanoak (on southerly slopes) naturally occur in association with redwood over large areas of the Reserve (tables 3-1 and 3-2). Other forest trees include grand fir, Sitka spruce, western red cedar, western hemlock, and in riparian zones, red alder. Natural understory species include salal and evergreen huckleberry. (Jimerson and Jones 2000.)

As previously described, 60% of the Reserve has been harvested, beginning in the late 1800s and continuing through most of the 1990s. The remaining 40% has remained relatively undisturbed. The timber harvesting significantly altered the natural vegetation, suppressing certain species and favoring others. This has created a mosaic of forest stands that are more accurately characterized by postharvest age than by potential vegetation. For purposes of Reserve management, therefore, it is important to consider the Reserve's vegetation in terms of seral stage, rather than simply natural plant associations. With the present cessation of timber harvesting, vegetation at the Reserve will tend to evolve back to a natural condition (which may differ somewhat from the preharvest condition) as characterized in tables 3-1 and 3-2. Proposed forest restoration actions (chapter 4) can assist in creating structure and species composition approaching preharvest conditions.

Table 3-1. Extent of Potential Natural Vegetation Types in the Headwaters Forest Reserve

Plant Association	Acres	Percent of Reserve
Redwood–Douglas-fir subseries		
Redwood–Douglas-fir/salal–evergreen huckleberry	3,369	45
Redwood–Douglas-fir/swordfern	712	10
Redwood-tanoak subseries		
Redwood-tanoak/evergreen huckleberry–salal	2,825	38
Redwood-tanoak/swordfern	38	<1
Redwood–western red cedar subseries		
Redwood–western hemlock/evergreen huckleberry–salal	123	2
Redwood–western hemlock/salmonberry/swordfern	22	<1
Redwood–grand fir subseries		
Redwood–grand fir/salal/swordfern	125	2
Redwood–red alder subseries		
Redwood–red alder/salmonberry	169	2
Redwood–Sitka spruce subseries		
Redwood–Sitka spruce/thimbleberry	89	1
Redwood–western red cedar subseries		
Redwood–western red cedar/swordfern	<u>2</u>	<u><1</u>
Total	7,472	100

Source: Jimerson and Jones 2000

Table 3-2. Environmental Characteristics of Vegetation Types in the Headwaters Forest Reserve

Plant Association	Elevation (feet)	Aspect	Slope	Slope Position
Redwood–Douglas-fir/salal–evergreen huckleberry	1,120–1,760	NE	5–45%	Middle-upper 1/3
Redwood-tanoak/swordfern	1,700–1,910	S, W	45–85%	Middle-lower 1/3
Redwood-tanoak/evergreen huckleberry–salal	920–2,140	SW, SE	15–65%	Upper-middle 1/3
Redwood–Douglas-fir/swordfern	330–1,700	NW, NE	5–80%	Upper-lower 1/3
Redwood–western hemlock/evergreen huckleberry–salal	1,150–1,640	NW, SW	10–80%	Middle-lower 1/3
Redwood–western hemlock/salmonberry/swordfern	600–700	W	2–5%	Streamside
Redwood–grand fir/salal/swordfern	1,060–1,690	NW, NE	15–55%	Upper-lower 1/3
Redwood–red alder/salmonberry	50–800	NW	2–5%	Streamside
Redwood/Sitka spruce/thimbleberry	40–120	N, W	1–5%	Lower 1/3
Redwood–western red cedar/swordfern	380–620	N	40–65%	Lower-middle 1/3

Source: Jimerson and Jones 2000

Forest Seral Stages

The following is a description of the various forest seral stages that have been mapped at the Reserve (figure 3-4) (Jimerson and Jones 2000). Seral-stage delineations are a useful basis for special-status plant management, wildlife-species management, forest restoration action, and management of recreation access over the next few to several decades.

The primary subdivisions of seral-stage forest types are unharvested and harvested, applying to 42% and 58% of the Reserve, respectively (table 3-3).

Table 3-3. Seral Stages of the Headwaters Forest

Seral Stage	Acreage	Percent of Reserve
Unharvested Forest		
Old-growth	1,947	26
Late-mature	434	6
Midmature with pre-dominant trees	519	7
Midmature	188	3
Early mature with pre-dominant trees	23	<1
Shrub/forb natural	5	<1
Harvested Forest		
Seed-tree harvested	433	6
Late-mature harvested	9	<1
Midmature harvested	838	11
Early-mature harvested with pre-dominant trees	153	2
Early-mature harvested	598	8
Pole harvested	1,677	22
Shrub-sapling harvested	<u>647</u>	<u>9</u>
Total	7,472	100

Note: "Pre-dominant trees" indicates that larger individuals are beginning to dominate the stand.

Source: Jimerson and Jones 2000

Unharvested Forest

Unharvested portions of the Reserve are generally not considered for active management in this plan, with the exception of the development of some trail access into them under certain alternatives. The seral stages found in the Reserve are described below.

- **Old-growth.** Old-growth forest, covering 1947 acres (26% of the Reserve), typically has 30–40 trees per acre, primarily redwood and Douglas-fir. They usually occur as widely spaced individuals, generally with diameters at breast height (dbh) greater than 60 inches and ages greater than 200–500 years. A variety of age classes of conifer species are represented with a high degree of both vertical and horizontal structural complexity. Understory vegetation is well developed and there is a significant component of large woody debris (LWD) on the forest floor.

- **Mature.** Because of natural substrate and topographic conditions, as well as wind and fire history, a substantial portion of the unharvested forest is not strictly considered “old-growth” but comprises somewhat younger groves considered “mature.” Occupying 1,164 acres (16% of the Reserve), these stands differ as a matter of degree rather than kind from the old-growth groves; in fact they tend to grade into one another. They tend to have fewer old-growth attributes, but are capable of attaining them. Average tree ages and diameters tend to be less, and stocking densities tend to be higher, with a larger Douglas-fir component. Understory vegetation is also well-developed with a significant LWD component.

Harvested Forest

Harvested portions of the Reserve are considered for active management in this plan, with the goal of accelerating successional change to natural mature and old-growth conditions (chapter 4). Forest seral stages and riparian zones at the Reserve are described below.

- **Seed-tree harvested.** Approximately 6% of the Reserve (433 acres) was harvested by seed-tree silvicultural prescriptions in which scattered single trees or small groups of mature or old-growth trees were retained across the harvest area, usually with random spacing. (This seral stage is referred to as *old-growth harvested* by Jimerson and Jones 2000) These stands generally have two distinct strata of conifers and a less-well-developed understory and LWD component. The overstory is composed of the residual trees, and the understory is usually a uniform pole or shrub-sapling stand with characteristics similar to pole or shrub-sapling stands described below.
- **Mature harvested.** These stands, covering 1,598 acres (21% of the Reserve), are generally more than 30 years old, representing regeneration in the earliest harvest units of the Reserve. They are highly variable in species compositions and structures. Average stem diameters are greater than 16 inches, and maximum stand height is greater than 100 feet. In general, redwood dominates the stands (44% to 71%), with Douglas-fir as the other principal species. Minor constituents, but often locally dense, include tanoak, western hemlock, and grand fir. Understory layers are better developed than in the pole/sapling stands because stand densities are less due to managed thinning and natural thinning processes. Principal understory species are salal, evergreen huckleberry, red huckleberry, salmonberry, and thimbleberry. Variability of stand structure depends on the history of management and/or natural processes. Some stands show characteristics similar to the pole stands (i.e., emerging dominance differentiation and little structural diversity), while older stands show strong variability in individual tree form and have highly variable structures, both vertically and horizontally.
- **Pole harvested.** These stands, covering 1,677 acres (22% of the Reserve), are composed of extremely dense stands of young conifer trees generally 15–35 years of age. Typically, 500–2,500 trees are present per acre. A sample regeneration survey showed Douglas-fir dominance (78%), with redwood and grand fir percentages of 21% and 1%, respectively. Tanoak is present in these stands but is a very minor component once these stands are well established. Structurally, the stands typically have a single overstory layer, with some understory composed of salal and evergreen huckleberry. The trees have diameters ranging from 6–14 inches dbh, and sometimes as large as 20 inches. Stand heights range from 40 to 75 feet.

Because of the density of these stands, live crown ratios are low and crown-base height is relatively high. These stands are extremely dense where they have developed on skid trails and layouts (i.e., beds prepared for the purpose of reducing breakage during the felling of large trees). Eventual overstory trees have begun to establish dominance over slower-

Figure 3-4a
Generalized Seral Stages of Vegetation
in the Headwaters Forest Reserve

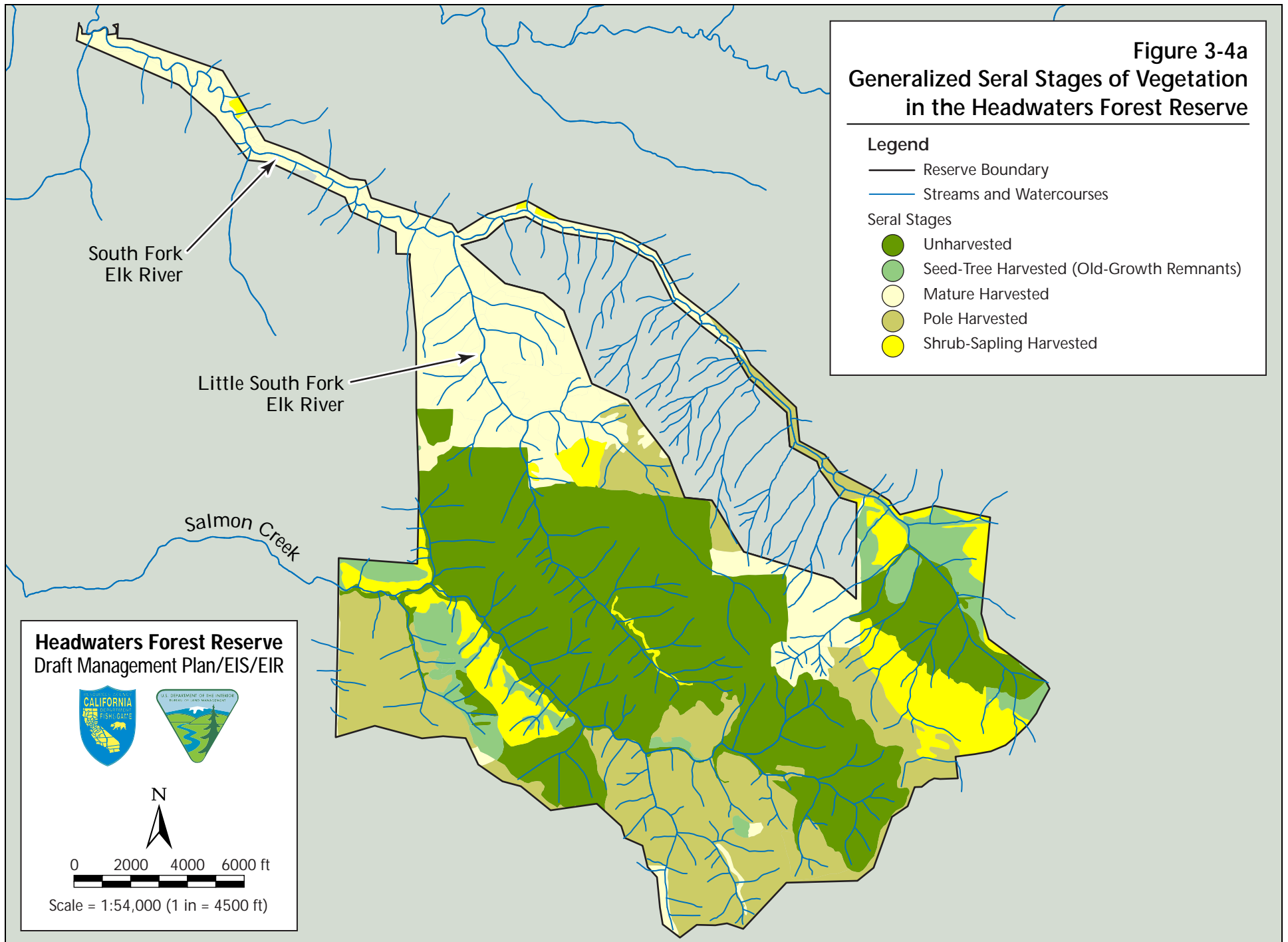
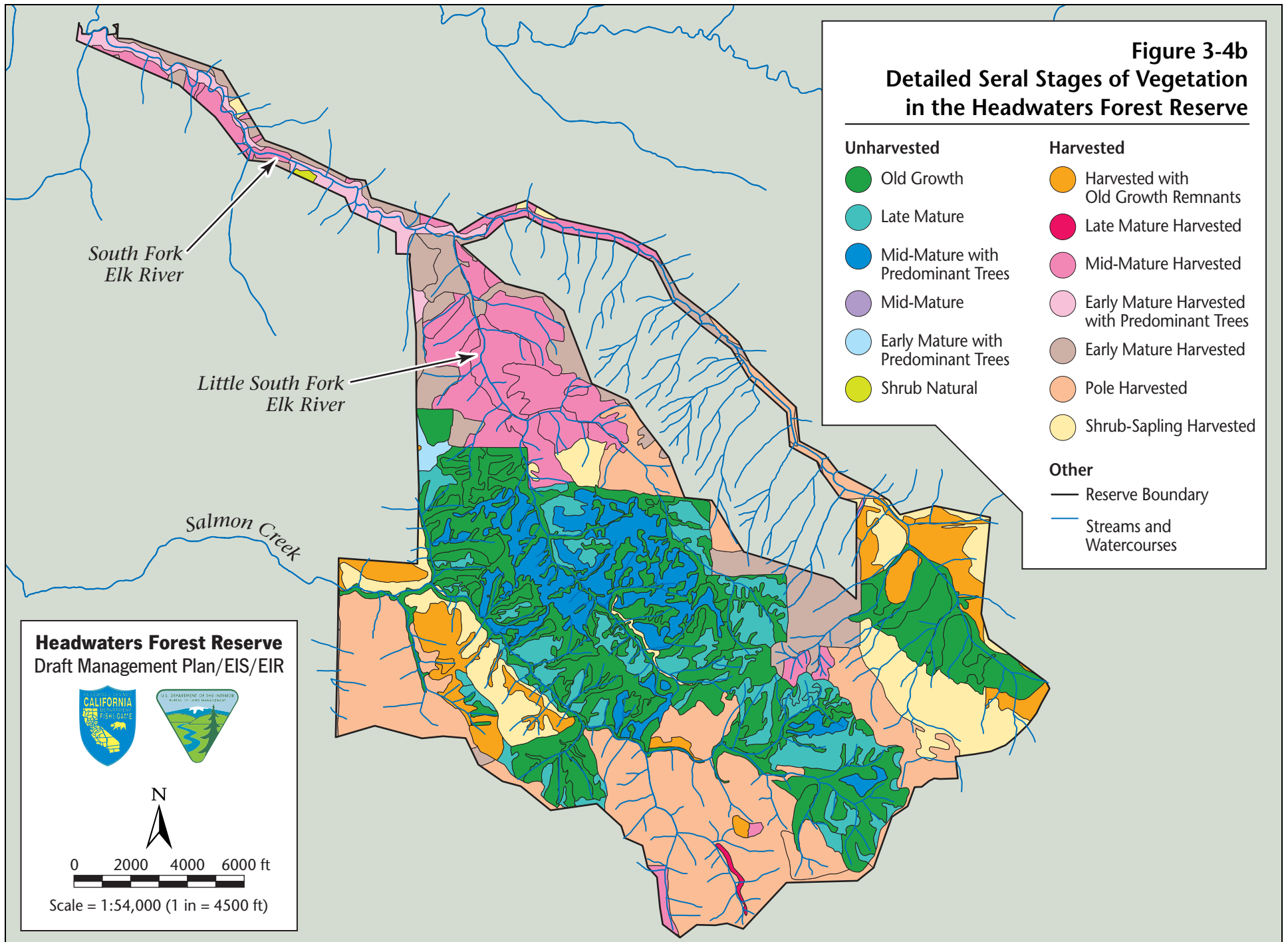


Figure 3-4b
Detailed Seral Stages of Vegetation
in the Headwaters Forest Reserve



growing trees that are at less of an advantage because of their siting, the availability of sunlight, etc. This overstory selection will accelerate through the pole stage.

- **Shrub-sapling harvested.** This type, covering 647 acres (9% of the Reserve), has developed on ground that was clearcut 10–15 years ago. The dominant vegetation is broad-leafed shrubs with hardwood and conifer saplings, seedlings, and sprouts. The young conifers are primarily seeded Douglas-fir and redwood stump sprouts, variably stocked from 500 to 3,000 per acre. Pacific madrone and tanoak are generally present in minor percentages, but in some instances tanoak is a major component and displaces conifer stocking. Relative species compositions and canopy percentages have not yet been inventoried. Redwood stump sprouts are scattered throughout the areas, but Douglas-fir seedlings are clumped, with extreme densities on old skid trails and layouts.
- **Riparian zones.** Vegetation along watercourses and seep areas in unharvested forests is dominated by redwoods and huckleberry. In harvested forests, it is dominated by hardwoods such as red alder and big leaf maple and by conifers such as western red cedar, Douglas-fir, Sitka spruce, and grand fir. Crown canopy closures are usually 90–100%, with well-developed vertical structure. The LWD component is also usually well developed.

Special-Status Plants, Fungi, Lichens, and Bryophytes

This section describes special-status vascular plants, fungi, lichens, and bryophytes (mosses, liverworts, and hornworts) that occur or may occur in the Reserve. Fungi, lichens, and bryophytes are collectively referred to as cryptogams.

Vascular Plants

Special-status plants are plants that are legally protected under ESA, CESA, or other regulations and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status plants are species in any of the following categories:

- plants listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants] and various notices in the Federal Register [proposed species]);
- plants that are candidates for possible future listing as threatened or endangered under ESA (61 FR 40: 7596-7613, February 28, 1996);
- plants listed or proposed for listing by the state as threatened or endangered under CESA (14 CCR 670.5);
- plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 et seq.);
- plants that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines, Section 15380);
- plants considered by the California Native Plant Society (CNPS) to be “rare, threatened, or endangered in California” (lists 1B and 2 described in Skinner and Pavlik 1994);
- plants listed by CNPS as species about which more information is needed to determine their status;

- plants of limited distribution (lists 3 and 4 described in Skinner and Pavlik 1994), which may be included as special-status species on the basis of local significance or recent biological information; and
- plants listed as sensitive, special-interest, or “Survey-and-Manage” by U.S. Forest Service (USFS) Region 5 (Forest Service Manual 2670), California BLM, or the 2001 record of decision for amendments to the Northwest Forest Plan (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

General field surveys for special-status plants have been conducted in the Reserve in conjunction with cryptogam surveys and forest stand examinations. Because of the types of habitats present in the Reserve, few special-status vascular plant species or populations are expected to occur. During other survey work in the Reserve, scattered populations of heart-leaved twayblade, a CNPS list 4 species, were observed (Wheeler pers. comm. and Scanlan pers. comm.). A list of special-status plants with potential to occur in the Reserve was developed through a search of the latest versions of the California Natural Diversity Data Base (CNDDB), CNPS Electronic Inventory, and descriptions of the vegetation types of the project area (Jimerson and Jones 2000, Wheeler pers. comm.). Special-status plants that may occur in the Reserve, their listing status, and known geographic distribution and ecological information are summarized in table 3-4.

Fungi, Lichens, and Bryophytes (Cryptogams)

No fungi, lichens, or bryophytes, collectively known as cryptogams, are currently listed or are candidates for listing under ESA or CESA. However, the CNPS has developed a list of lichens and bryophytes that are considered rare. In addition, the Northwest Forest Plan contains a list of Survey-and-Manage species that includes fungi, lichens, and bryophytes (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

McFarland and Largent (2000) are conducting protocol-level surveys to identify cryptogams in representative plots in the Reserve. Complete surveys for cryptogams require at least five years of studies, and only two years have been completed to date. Fifty-six permanent monitoring plots at least 0.10 hectare in size were established throughout the forest and distributed among sites that capture the range of vegetation communities, seral stages, slope exposures, and slope positions in the Reserve. The plots were revisited multiple times on a weekly or biweekly basis during mushroom season and after storm events from 1999 through spring 2001, and all species of cryptogams were recorded. Survey-and-Manage species, the number of plots in which they were identified, and their microhabitat requirements are summarized in table 3-5.

A total of 458 species of fungi, lichens, and bryophytes have been recorded to date in the Reserve. The Reserve supports a relatively rich composition of fungal species, with 340 species identified to date. The most species-rich sites for fungi include north-to-east facing midslopes with a redwood/Douglas-fir overstory and a tanoak/huckleberry understory. Young, early-successional, even-aged and monotypic forest stands that were previously logged supported the fewest number of cryptogam species. Exceptions occurred where some late-mature trees had been retained in the harvested stands (i.e., seed-tree harvested stands), which provided source populations of cryptogams to repopulate the site (McFarland and Largent 2000).

A total of 24 Survey-and-Manage fungi species have been identified in the Reserve. Three fungal Survey-and-Manage species have been found only once in the Reserve and have not been identified on other BLM lands in California. These relatively rare species include *Clitocybe subditopoda*, *Dermocybe humboldtensis*, and *Gyromitra infula*.

Table 3-4. Special-Status Vascular Plants with Potential to Occur in the Headwaters Forest Reserve

Common and Scientific Name	Legal Status ^a	Geographic Distribution	Ecological Information
	Federal/State/CNPS		
Small groundcone <i>Boschniakia hookeri</i>	--/--/2	Western north Coast Ranges; Del Norte, Humboldt, Mendocino, and Marin Counties; Oregon, Washington	North coast coniferous forest, parasitic on <i>Gaultheria shallon</i> and <i>Vaccinium</i> sp.; blooms April–August
Northern clustered sedge <i>Carex arcta</i>	--/--/2	North coast; Del Norte, Humboldt, Mendocino, and Tulare Counties; Idaho, Oregon, Washington	Bogs and fens, moist places in north coast coniferous forest, 60–1,400 meters in elevation; blooms June–August
Flaccid sedge <i>Carex leptalea</i>	--/--/2	North Coast Ranges, central coast; Del Norte, Humboldt, Marin, and Trinity Counties; Idaho, Oregon	Bogs and fens, mesic meadows, marshes and swamps, 0–790 meters in elevation; blooms May–July
Meadow sedge <i>Carex praticola</i>	--/--/2	North coast, central and southern Sierra Nevada; Del Norte, Humboldt, Madera, Mono, and Tuolumne Counties; Idaho, Oregon, Washington	Mesic meadows; blooms May–July
Clustered lady's-slipper <i>Cypripedium fasciculatum</i>	S&M (C) SC/--/4	Northwestern California, Cascade Range, northern Sierra Nevada, southwestern San Francisco Bay area; Idaho, Oregon, Utah, Washington, Wyoming	Lower montane coniferous forest, north coast coniferous forest, usually serpentinite seeps and streambanks, 100–2,000 meters in elevation; blooms March–July
Mountain lady's-slipper <i>Cypripedium montanum</i>	S&M (C) --/--/4	Del Norte, Glenn, Humboldt, Madera, Mendocino, Modoc, Mariposa, Plumas, Shasta, Sierra, Siskiyou, Sonoma, Tehama, Trinity, Tuolumne, and possibly San Mateo and Santa Cruz Counties; Idaho, Oregon, Washington, Wyoming	Broad-leaved upland forest, lower montane coniferous forest; blooms March–July
Coast fawn lily <i>Erythronium revolutum</i>	--/--/2	Del Norte, Humboldt, Mendocino, Siskiyou, and Sonoma Counties; Oregon and Washington	Moist areas and streambanks within bogs and fens, broadleaf upland forest, north coast coniferous forest, 0–1,065 meters in elevation; blooms March–June
American manna grass <i>Glyceria grandis</i>	--/--/2	Scattered occurrences in the north coast and Sierra Nevada; Humboldt, Mariposa, and Placer Counties	Wet places, bogs and fens, meadows, marshes, streambeds and lake margins; blooms June–August

Table 3-4. Continued

Common and Scientific Name	Legal Status ^a	Geographic Distribution	Ecological Information
	Federal/State/CNPS		
Western lily <i>Lilium occidentale</i>	E/E/1B	Del Norte and Humboldt Counties; Oregon	Bogs and fens, coastal bluff scrub, coastal prairie, coastal scrub, freshwater marshes and swamps, openings in north coast coniferous forest, often on well-drained old beach washes overlain with wind-blown alluvium and organic topsoil, usually near margins of Sitka spruce, 2–185 meters in elevation; blooms June–July
Heart-leaved twayblade <i>Listera cordata</i>	--/--/4	Del Norte, Humboldt, Mendocino, and Siskiyou Counties; Nevada, Oregon, Washington	Bogs and fens, lower montane coniferous forest, North Coast coniferous forest; blooms February–July
Running-pine <i>Lycopodium clavatum</i>	--/--/2	Humboldt County; Idaho, Oregon, Washington	Marshes and swamps, mesic North Coast coniferous forest, in shady and semi-exposed forest floors 60–610 meters in elevation; blooms July–August
Leafy-stemmed mitrewort <i>Mitella caulescens</i>	--/--/2	Del Norte, Humboldt, Mendocino, Siskiyou, and Tehama Counties; Idaho and Oregon	North coast and lower montane coniferous forest, broad-leaved upland forest, meadows; 610–1,700 meters in elevation; blooms May–July
Indian-pipe <i>Monotropa uniflora</i>	--/--/2	Del Norte and Humboldt Counties; Oregon, Washington	Broad-leaved upland forest, north coast coniferous forest, often under redwoods or western hemlock, 10–200 meters in elevation; blooms June–July
Howell's montia <i>Montia howellii</i>	SC/--/2	Western north Coast Ranges; Del Norte, Humboldt, and Trinity Counties; Oregon, Washington, British Columbia	Meadows, north coast coniferous forest, freshwater emergent wetland, including meadows and other vernal wet areas in Douglas-fir forest, annual grasslands, vernal pools, compacted soils, 0–400 meters in elevation; blooms March–May
Maple-leaved checkerbloom <i>Sidalcea malachroides</i>	--/--/1B	North coast and northern central coast from Humboldt County to Monterey County; Oregon	Coastal scrub, perennial grassland, redwood forest, Douglas-fir forest, often in open, often disturbed areas, 2–760 meters in elevation; blooms May–August
Siskiyou checkerbloom <i>Sidalcea malviflora</i> ssp. <i>patula</i>	SC/--/1B	Del Norte and Humboldt Counties; Oregon	Coastal bluff scrub, coastal prairie, and North Coast coniferous forest, 15–700 meters in elevation; blooms May–June

Table 3-4. Continued

Common and Scientific Name	Legal Status ^a		Geographic Distribution	Ecological Information
	Federal/State/CNPS			
Coast checkerbloom <i>Sidalcea oregana</i> ssp. <i>eximia</i>	--/--/1B		Del Norte and Humboldt Counties	Lower montane coniferous forest, meadows, and North Coast coniferous forest, gravelly soils, 0-1,800 meters in elevation; blooms June–August
Trifoliolate laceflower <i>Tiarella trifoliata</i> var. <i>trifoliata</i>	--/--/3		Humboldt and Trinity Counties; Oregon	Lower montane coniferous forest, north coast coniferous forest; blooms June

Note: With one exception, none of the plants in this table have been detected in the Reserve, but surveys for them have not yet been conducted. The heart-leaved twayblade has been observed at 1 location in the harvested/unharvested portion of the Reserve.

^a Listing Status

Federal

- E = listed as endangered under the federal Endangered Species Act.
- SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
- S&M = Survey-and-Manage Species as defined in the 2001 Northwest Forest Plan ROD. Category C species are uncommon, predisturbance surveys are practical; identify and manage high priority sites for conservation.
- = no status definition.

State

- E = listed as endangered under the California Endangered Species Act.
- = no status definition.

California Native Plant Society

- 1A = presumed extinct in California.
- 1B = rare, threatened, or endangered in California and elsewhere.
- 2 = rare, threatened, or endangered in California but more common elsewhere.
- 3 = plants about which more information is needed to determine their status.
- 4 = plants of limited distribution, a watch list.

Sources: California Native Plant Society (CNPS) 2000.
California Natural Diversity Database (CNDDB) 2001.
Skinner, M. W., and B. M. Pavlik 2000.
California Department of Fish and Game 2001.

Table 3-5. Fungi and Lichen Survey-and-Manage Species Identified in the Headwaters Forest Reserve

Fungi	Survey-and- Manage Category*	Number of Plots	Microhabitats
<i>Cantharellus subalbidus</i>	D	6	Duff under tanoak
<i>Chalciporus (Boletus) piperatus</i>	D	2	Duff under conifers
<i>Clitocybe subditopoda</i>	B	1	Duff under conifers/hardwoods
<i>Collybia racemosa</i>	B	2	Old fungi, in conifer duff
<i>Craterellus (Cantharellus) tubaeformis</i>	D	7	Terrestrial on rotting wood, humus
<i>Dermocybe humboldtensis</i>	B	1	Hardpacked soil
<i>Galerina vittaeformis</i>	B	2	Rotting wood, sometimes with moss
<i>Gomphus clavatus</i>	B	10	Duff under tanoak
<i>Gomphus floccosus</i>	F	3	Duff under tanoak
<i>Gyromitra infula</i>	B	1	Hardpacked soil under Douglas-fir
<i>Hydnum umbilicatum</i>	B	9	Duff under tanoak
<i>Mycena quinaultensis</i>	B	2	Hypogeous under conifer
<i>Mycena tenax</i>	B	3	Duff under conifers
<i>Otidea leporina</i>	B	1	Duff under conifers/hardwoods
<i>Otidea onotica</i>	F	1	Duff under conifers/hardwoods
<i>Phaeocollybia fallax</i>	D	1	Duff under conifers/hardwoods
<i>Phaeocollybia olivacea</i>	B	1	Duff under conifers/hardwoods
<i>Plectania melastoma</i>	F	9	Conifer and hardwood small woody debris
<i>Ramaria araiospora</i>	B	3	Duff under tanoak
<i>Ramaria botrytis</i> var. <i>aurantiiramosa</i>	B	2	Duff under tanoak
<i>Ramaria gelatiniaurantia</i>	B	3	Duff under conifers
<i>Ramaria largentii</i>	B	2	Duff under conifers
<i>Ramaria verlotensis</i>	B	1	Duff under conifers
<i>Rickanella swartzii</i> (<i>R. setipes</i>)	B	1	Soil under conifers

Table 3-5. Continued

Fungi	Survey-and- Manage Category*	Number of Plots	Microhabitats
Lichens			
<i>Lobaria oregana</i>	A	3	Mossy branches and trunks of hardwoods and conifers
<i>Nephroma bellum</i>	F	1	Mossy branches and trunks of hardwoods
<i>Usnea longissima</i>	A	11	Branches of older conifers

* Survey-and-Manage Categories:

- A Rare; manage all known sites and minimize inadvertent loss of undiscovered sites; conduct predisturbance and strategic surveys.
- B Rare; manage all known sites and minimize inadvertent loss of undiscovered sites; predisturbance surveys are not practical; conduct strategic surveys.
- C Uncommon; identify and manage high-priority sites; conduct predisturbance and strategic surveys.
- D Uncommon; identify and manage high-priority sites; predisturbance surveys are not practical; conduct strategic surveys.
- F uncommon or concern for persistence unknown; determine if species meets basic criteria for Survey-and-Manage status based on new information; management of known sites not required; conduct strategic surveys.

Source: McFarland and Largent 2000.

Relatively few lichen and bryophyte species have been identified in the Reserve compared to other public lands in the region. The lichen and bryophyte list is still being compiled; the expected completion date is summer 2001. To date, three Survey-and-Manage lichens have been identified in the forest, one of which, *Usnea longissima*, is also considered rare by the CNPS. Two bryophyte genera, *Tetraphis* and *Buxbaumia*, were identified during the cryptogam surveys. Both of these genera have species that are Survey-and-Manage species, but characteristics for species-level identification were lacking.

Invasive Nonnative Plant Species

Several nonnative plant species occur in the Reserve, some of which are considered noxious weeds. Surveys and mapping of noxious weed populations will be conducted during 2001. Weed species identified to date have been recorded as part of other survey work in the forest.

In general, most nonnative plants are restricted to areas of past disturbances to the soil and forest cover. Old-growth forests and stands with high-crown closure do not provide suitable habitats for most weed species. The most widespread noxious weed in the project area is pampas grass (*Cortaderia jubata*), which occurs throughout the project area on roadcuts and other disturbed sites lacking forest cover. Other weed species include Himalaya berry (*Rubus discolor*) and English ivy (*Hedera helix*), which occur along the South Fork Elk River (Wheeler pers. comm.). The northwest portion of the Reserve near the Elk River Trailhead and the historical town of Falk contain the greatest number of nonnative species, generally associated with historical landscaping. Most of these species are not considered invasive and are unlikely to spread to other parts of the Reserve.

Aquatic Species and Habitat Needs

Common Species

As described under "General Aquatic Habitat Conditions" above, the Reserve includes the headwaters of Salmon Creek, South Fork Elk River, and Little South Fork Elk River, which contain populations of anadromous and freshwater resident fish species. Common native fish species that may be found in these waterways include sculpin (*Cottus* spp.), threespine stickleback (*Gasterosteus aculeatus*), and nonanadromous (i.e., resident) rainbow steelhead and cutthroat trout (*Oncorhynchus clarki clarki*).

Special-Status Species

As previously discussed, four species of anadromous salmonids occur in or near the Reserve: chinook salmon, coastal cutthroat trout, coho salmon, and steelhead (table 3-6). Three evolutionarily significant units (ESUs) are listed as threatened under ESA, and one species, coho salmon, is a state-candidate endangered species. The three federally listed ESUs are the California coastal chinook salmon ESU, the southern Oregon/northern California coho salmon ESU, and the northern California steelhead ESU. In addition, critical habitat, which includes the riparian zones of the Reserve, has been designated under ESA for the southern Oregon/northern California coho salmon and California coastal chinook salmon ESUs. Critical habitat is defined as specific areas, both occupied or unoccupied, that are essential to the conservation of a listed species and that may require special management considerations or

protection. NMFS conducted a status review of the southern Oregon/California coastal cutthroat trout ESU and determined that this ESU was not presently in danger of extinction, nor was it likely to become so in the foreseeable future. However, coastal cutthroat trout are a DFG state species of special concern.

Pacific salmon and trout are indicators of a properly functioning aquatic ecosystem because they require cool, clean water, complex channel structures and substrates, and low levels of silt. Excessive water temperatures, high turbidity, sedimentation of habitats, loss of cover and habitat complexity, sport and commercial harvest, pollution, poor hatchery practices, and migration barriers are some of the factors that have contributed to the decline in population abundance of wild stocks for all four species. The establishment of conditions, constraints, and practices that maintain watershed integrity and restoration of problem areas that continue to degrade aquatic habitats are primary objectives needed to restore anadromous salmonid populations.

The information presented below on the life history of coho and chinook salmon, steelhead, and coastal cutthroat trout is based on Shapovolov and Traft (1954), Moyle (1976), and Moyle et al. (1995).

Coho Salmon

Adult coho salmon leave the ocean and migrate up coastal rivers and streams in the fall and early winter. Most spawning occurs in November–January. Females excavate redds (nests) in clean gravel with their tails. Eggs are deposited in the redds where they incubate for 2–3 months, depending on water temperature. Incubation times are inversely related to water temperature; higher water temperatures result in shorter incubation times. After hatching, the young emerge from the gravel and take up residence in the streams. Optimal habitat for young appears to be deep pools containing rootwads and boulders in heavily shaded stream sections. Juvenile coho salmon rear in freshwater for approximately one year before emigrating to the ocean as smolts. As previously noted, coho salmon occur in the South Fork Elk River within the Reserve boundaries and in Salmon Creek downstream of the Reserve (figure 3-5).

Chinook Salmon

Adult chinook salmon leave the ocean and migrate up coastal rivers and streams in the fall to spawn. Most spawning occurs in October–December. Spawning behavior and egg incubation is similar to that described for coho salmon. After hatching, young chinook salmon rear in their natal streams for a relatively short time before emigrating to the ocean in spring, although a few juveniles may oversummer in freshwater before emigrating. As previously noted, chinook salmon occur in the South Fork Elk River within the Reserve boundaries (figure 3-5).

Steelhead

Adult steelhead leave the ocean and migrate up coastal rivers and streams in late fall and winter. Spawning can occur from December through April and probably peaks in January–March. Spawning behavior and egg incubation are similar to that described for coho salmon. After hatching, young steelhead rear in freshwater for 1–3 years before emigrating to the ocean as smolts. Smolt emigration typically occurs during spring (March–June). As previously noted, steelhead occur in the South Fork Elk River up to the headwaters, the lower 0.25 mile of the Little South Fork Elk River, and Salmon Creek below the Reserve boundary (figure 3-5).

Table 3-6. Special-Status Fish and Wildlife Species of the Headwaters Forest Reserve

Common and Scientific Name	Status ^a	California Distribution	Habitats	Occurrence in Headwaters Forest
	Federal/State			
Oregon shoulderband snail <i>Helminthoglypta hertleini</i>	SM/--	Klamath region, from Douglas County, Oregon to Siskiyou County, California; suspected to occur in Arcata Field Office lands but not in the Reserve	Talus and rocky substrates with permanent ground cover, fissures, piles of woody debris	Minimal suitable habitat present; no confirmed detections
Church's sideband snail <i>Monadenia churchi</i>	SM/--	Butte, Humboldt, Shasta, Siskiyou, Tehama, and Trinity Counties area; suspected to occur within Arcata Field Office lands but not in the Reserve	Rocky outcroppings, talus, lava rock substrates, limestone outcroppings, especially in riparian areas	Suitable habitat present; no confirmed detections
Shasta chaparral snail <i>Trilobopsis roperi</i>	SM/--	Shasta County; not expected to occur within the Reserve area	Within 100 meters of lightly to heavily shaded rockslides, limestone outcroppings, caves, and draws	No suitable habitat present; no confirmed detections
Tehama chaparral snail <i>Trilobopsis tehamana</i>	SM/--	Tehama, Butte, and Siskiyou Counties	Within 100 meters of lightly to heavily shaded rockslides, limestone outcroppings, caves, talus, and woody habitat	No suitable habitat present; no confirmed detections
Steelhead trout <i>Oncorhynchus mykiss</i> Northern California ESU	T/--	Redwood Creek, Humboldt County to Gualala River, Mendocino County; known to occur in Reserve	Cold, clear water with clean gravel of appropriate size for spawning; most spawning occurs in headwater streams; steelhead migrate to the ocean as smolts to feed and grow until sexually mature	Confirmed present
Chinook salmon <i>Oncorhynchus tshawytscha</i> California Coastal ESU	T/--	Redwood Creek, Humboldt County to the Russian River, Sonoma County; fall-run chinook known to occur in Reserve; critical habitat designated	Cool, clear water with spawning gravel; migrate to the ocean to feed and grow until sexually mature	Confirmed present

Table 3-6. Continued

Common and Scientific Name	Status ^a	California Distribution	Habitats	Occurrence in Headwaters Forest
	Federal/State			
Coho Salmon <i>Oncorhynchus kisutch</i> Southern Oregon/Northern California Coasts ESU	T/C	Cape Blanco, Oregon to Punta Gorda, California; known to occur in Reserve; critical habitat designated	Cool, clear water with spawning gravel; migrate to the ocean to feed and grow until sexually mature	Confirmed present
Coastal cutthroat trout <i>Oncorhynchus clarki clarki</i> Southern Oregon /California Coasts ESU	SC/SSC	Coastal streams from Eel River north	Small, low-gradient streams and estuarine habitat with clear, cool waters, shade, and instream cover	Confirmed present
Del Norte salamander <i>Plethodon elongatus</i>	SC/SSC	Coastal portions of Del Norte County and northern Humboldt County	Humid coastal forests among rocks and rubble of riverbeds, road fills, talus, and rock outcrops	Suitable habitat present; predisturbance surveys conducted; no detections
Southern torrent (seep) salamander <i>Rhyacotriton variegatus</i> (= <i>olympicus</i>)	SC/SSC	Northwestern California forests in Del Norte, Humboldt, western Siskiyou, Trinity, and Mendocino Counties; known to occur in the Reserve	Seeps, springs, and high-gradient reaches of small forested streams; usually found in or adjacent to cool, shallow water beneath rocks or organic debris	Confirmed present
Northern red-legged frog <i>Rana aurora aurora</i>	SC/SSC	Del Norte, Humboldt, and western Siskiyou Counties; known to occur in the Reserve	Usually found near ponds or other permanent water bodies with extensive vegetation	Confirmed present
Foothill yellow-legged frog <i>Rana boylei</i>	SC/SSC	Klamath, Cascade, north Coast, south Coast, and Transverse Ranges; through the Sierra Nevada foothills up to approximately 6,000 feet (1,800 meters) south to Kern County	Creeks or rivers in woodlands or forests with rock and gravel substrate and low overhanging vegetation along the edge; usually found near riffles with rocks and sunny banks nearby	Suitable habitat present; no confirmed detections
Tailed frog <i>Ascaphus truei</i>	SC/SSC	Northwestern California from Del Norte County south to central Sonoma County and east as far as southwest Shasta County	Cool, perennial, swiftly flowing streams in redwood, Douglas-fir, and yellow pine forests	Confirmed present

Table 3-6. Continued

Common and Scientific Name	Status ^a	California Distribution	Habitats	Occurrence in Headwaters Forest
	Federal/State			
Northwestern pond turtle <i>Clemmys marmorata marmorata</i>	SC/SSC	California range extends from Oregon border of Del Norte and Siskiyou Counties south along coast to San Francisco Bay, inland through Sacramento Valley, and on the western slope of Sierra Nevada; range overlaps with that of southwestern pond turtle through the Delta and Central Valley to Tulare County	Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation	Suitable habitat present; no confirmed detections
Osprey <i>Pandion haliaetus</i>	--/SSC	Nests along the north coast from Marin County to Del Norte County, east through the Klamath and Cascade Ranges, and the upper Sacramento Valley; important inland breeding populations at Shasta Lake, Eagle Lake, and Lake Almanor and small numbers elsewhere south through the Sierra Nevada; winters along the coast from San Mateo County to San Diego County	Nests in snags or cliffs or other high, protected sites near the ocean, large lakes, or rivers with abundant fish populations	Confirmed present; 1 nest site in Reserve
Bald eagle <i>Haliaeetus leucocephalus</i>	T/E	Nests in Siskiyou, Modoc, Trinity, Shasta, Lassen, Plumas, Butte, Tehama, Lake, and Mendocino Counties and in the Lake Tahoe Basin; reintroduced into central coast; winter range includes the rest of California, except the southeastern deserts, very high altitudes in the Sierras, and east of the Sierra Nevada south of Mono County; range expanding	In western North America, nests and roosts in coniferous forests within 1 mile of a lake, a reservoir, a stream, or the ocean	Suitable habitat present; no confirmed detections
American peregrine falcon <i>Falco peregrinus anatum</i>	--/FP	Permanent resident on the north and south Coast Ranges; may summer on the Cascade and Klamath Ranges south through the Sierra Nevada to Madera County; winters in the Central Valley south through the Transverse and Peninsular Ranges and the plains east of the Cascade Range	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes that support large populations of other bird species	Suitable habitat present; no confirmed detections

Table 3-6. Continued

Common and Scientific Name	Status ^a	California Distribution	Habitats	Occurrence in Headwaters Forest
	Federal/State			
Marbled murrelet <i>Brachyramphus marmoratus</i>	T/E	Nesting sites from the Oregon border to Eureka and between Santa Cruz and Half Moon Bay; winters in nearshore and offshore waters along the entire California coastline; known to occur in Reserve	Mature, coastal coniferous forests for nesting; nearby coastal water for foraging; nests in conifer stands greater than 150 years old and may be found up to 35 miles inland; winters on subtidal and pelagic waters often well offshore	Confirmed present
Northern spotted owl <i>Strix occidentalis caurina</i>	T/SSC	A permanent resident throughout its range; found in the north Coast, Klamath, and western Cascade Ranges from Del Norte County to Marin County; known to occur in Reserve	Dense old-growth forests dominated by conifers with topped trees or oaks available for nesting crevices	Confirmed present
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	SC/E	Summer range includes a narrow strip along the eastern Sierra Nevada from Shasta County to Kern County, another strip along the western Sierra Nevada from El Dorado County to Madera County; widespread in migration	Riparian areas and large, wet meadows with abundant willows for breeding; usually found in riparian habitats or edges of clear cuts during fall migration	Low potential, suitable habitat in Elk River corridor for migrants
California red tree vole <i>Arborimus pomo</i>	SC/SSC	North Coast Ranges from Sonoma County to the Oregon border; known to occur in Reserve	Inhabits old-growth forests of Douglas-fir, redwood, or montane hardwood-conifer species	Confirmed present
Pacific fisher <i>Martes pennanti pacifica</i>	SC/SSC	Coastal mountains from Sonoma County to Del Norte County, through Cascades to Lassen County; also from Fresno County through the Sierra Nevada but is believed to be extirpated from the northern Sierra Nevada	Mixed conifer habitats with high overstory cover; preference for riparian areas and other ecotonal habitats	Suitable habitat present; no confirmed detections

Table 3-6. Continued

Note: ESU = Evolutionarily significant unit.

^a Status definitions:

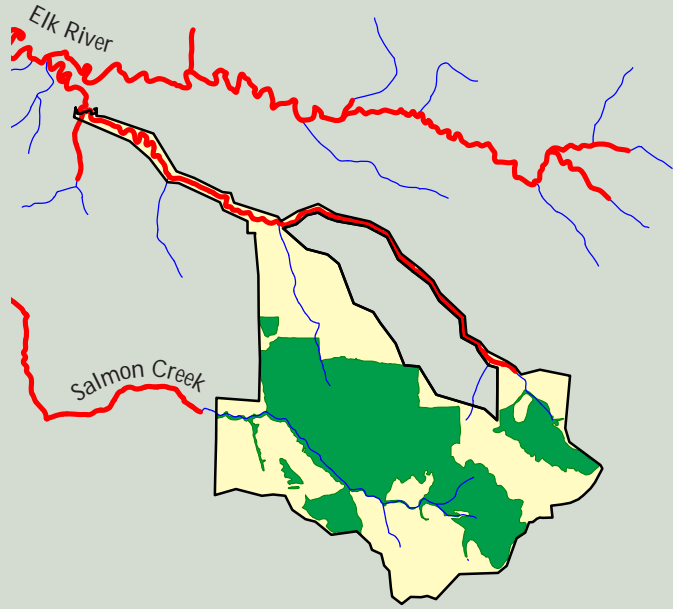
Federal

- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- PE = proposed for federal listing as endangered under the federal Endangered Species Act.
- PT = proposed for federal listing as threatened under the federal Endangered Species Act.
- C = species for which U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list.
- SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
- SM = Survey-and-Manage species.
- = no listing.

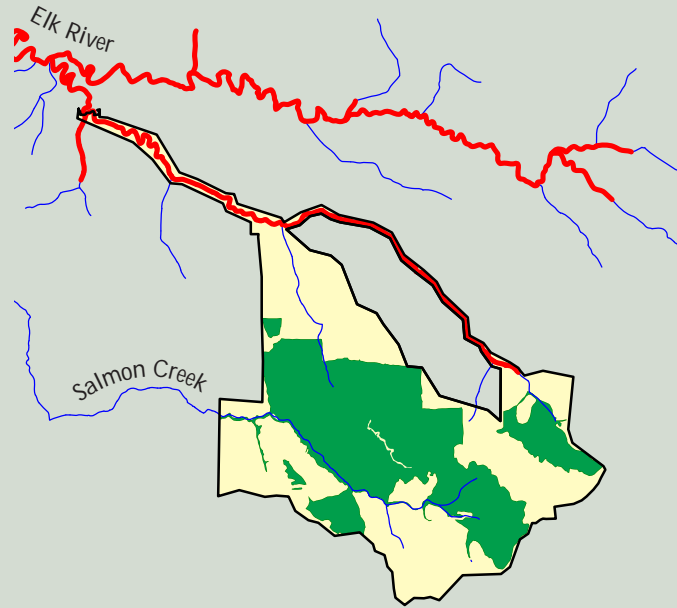
State

- E = listed as endangered under the California Endangered Species Act.
 - T = listed as threatened under the California Endangered Species Act.
 - R = listed as rare under the California Native Plant Protection Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.
 - C = candidate species for listing under the California Endangered Species Act.
 - SSC = species of special concern in California.
 - FP = fully protected.
 - = no listing.
-

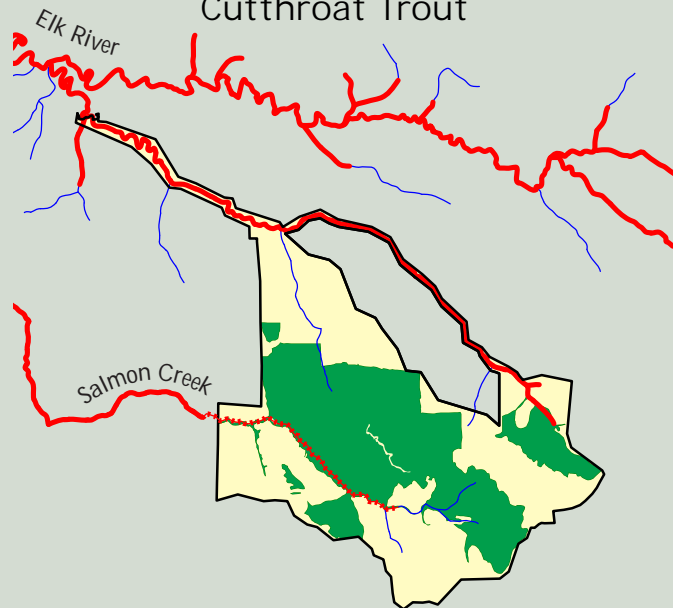
Coho Salmon



Chinook Salmon



Cutthroat Trout



Steelhead Trout



Figure 3-5
Range of Anadromy
in the Headwaters
Forest Reserve

Legend

- Reserve Boundary
- Range of Anadromy
- Probable Non-Anadromous Population
- Unoccupied Perennial Streams

Vegetation Types

- Unharvested Forest
- Harvested Forest

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



0 5,000 10,000 15,000ft

Scale = 1:150,000 (1 in = 12,500 ft)

Coastal Cutthroat Trout

In Northern California, coastal cutthroat trout begin to leave the ocean and migrate up spawning streams after the first fall rains. Spawning typically occurs in January or February. Cutthroat typically spawn and rear farther upstream than do steelhead or coho salmon, which are competitively dominant over cutthroat trout. Spawning behavior and egg incubation are similar to that as described for coho salmon. After hatching, young coastal cutthroat trout rear in freshwater for up to five years, although some spend their entire lives in freshwater. After migrating to sea, juvenile cutthroat trout remain close inshore and most remain in the estuary. Adult coastal cutthroat trout spend one to several years in saltwater but may migrate upstream each year to spawn. As previously noted, anadromous coastal cutthroat trout occur in the Reserve's South Fork Elk River up to the headwaters and in Salmon Creek downstream of the Reserve. A non-anadromous population exists in Salmon Creek within the Reserve (figure 3-5).

Factors Affecting Abundance of Anadromous Salmonids at the Reserve

The Elk River and Salmon Creek watersheds once supported abundant runs of native anadromous salmonids. Habitat loss and degradation is the human-caused factor that has had the greatest effect on the abundance of anadromous salmonids. Other factors that have contributed to low abundance relative to historical conditions include commercial and sportfishing harvest, changes in ocean temperature and prey availability, entrainment in diversions, continued habitat degradation, contaminants, species interactions (e.g., presence of or predation by nonnative species), and artificially propagated stocks.

Relative to historical conditions, the Elk River and Salmon Creek watersheds have been highly modified. Timber harvesting has occurred in the upland areas for more than a century, while the lowland areas bordering Humboldt Bay have been leveed and drained and converted for agricultural purposes (e.g., pasture). The Humboldt Bay estuary and surrounding wetlands receive contaminated runoff from agricultural lands and roadway surfaces and discharges from industries and municipalities. As a consequence of a century of watershed disturbances, large quantities of sediment have been introduced into the rivers and streams within these watersheds. As previously described, excessive sediment input into streams has degraded spawning and rearing habitat for fish by filling in pool habitats and causing stream gravels to have a higher-than-normal percentage of fine sediments (PALCO 1999). In Salmon Creek, the combination of accumulated sediments and woody material has formed numerous debris jams that have created partial and sometimes complete barriers to migrating fish (California Department of Fish and Game 1984). Farther downstream, the large volume of sediment introduced into the bay and estuary has contributed to sedimentation of habitats, causing aquatic organisms to be displaced or completely buried. Levees that have been constructed along the lower watercourses have separated the river and stream channels from their floodplain. Floodplain habitats are important nursery areas and refugia for many aquatic organisms, including anadromous salmonids.

Current Monitoring and Restoration Programs

In response to the continual decline in abundance of anadromous salmonids, various agencies and resource conservation groups have initiated monitoring programs to assess the current status of fish populations and habitat conditions in the region, including streams within the Elk River and Salmon Creek watersheds. For example, a multiyear, regional abundance survey of juvenile coho salmon in the Mad River-Redwood Creek Hydrologic Unit was initiated in 1999 to monitor abundance in, among others, the Humboldt Bay tributaries. Similarly, in response to a heightened

interest in the potential effects of altered stream temperatures on salmonids and other aquatic organisms, a regional stream temperature assessment was initiated to identify thermally sensitive streams and to characterize temperature regimes of the various watersheds across the region. Both of these programs are part of the Humboldt State University Foundation, Forest Science Project. In addition to these monitoring programs, other monitoring efforts include water quality monitoring on Salmon Creek in the Humboldt Bay National Wildlife Refuge by the USFWS and summer water temperature monitoring on Reserve streams by BLM.

Restoration projects within the Elk River and Salmon Creek watersheds below the Reserve include decommissioning of inner gorge roads along Salmon Creek and vegetation planting, channel realignment, and tidal gate modification along Salmon Creek within the wildlife refuge. Within the Reserve, BLM initiated an interim watershed restoration and emergency sediment reduction program in 2000 to reduce the threat of immediate erosion and to prevent further deterioration of streams. In addition to road repair and emergency sediment reduction, BLM is performing trail maintenance along South Fork Elk River to reduce sedimentation to the South Fork and Little South Fork Elk River.

Wildlife Species and Habitat Needs

Common Species

North coast coniferous forest habitats provide food, cover, and unique habitat elements for many wildlife species (Mayer and Laudenslayer 1988, Schoenherr 1992). More than half of the forest land on the Reserve has been disturbed, at some level, by timber harvesting practices. As a result of this disturbance, a variety of habitat types currently occur in the Reserve. The following is a discussion of five distinct habitat types (shrub-sapling harvested, pole harvested, mature harvested and unharvested, old-growth, and riparian forest) and examples of common wildlife species associated with these habitats.

Shrub-Sapling Harvested Habitat

Shrub-sapling harvested habitat consists of recently clearcut forests that are now dominated by broad-leafed shrubs (salal and blue blossom) with coniferous seedlings and saplings. Common wildlife species that are able to tolerate drier, warmer temperatures include ensatina (*Ensatina eschscholtzii*), gopher snake (*Pituophis melanoleucus*), western fence lizard (*Sceloporus graciosus*), Bewick's wren (*Thryomanes bewickii*), California ground squirrel (*Otospermophilus beecheyi*), black-tail deer (*Odocoileus hemionus*), and striped skunk (*Mephitis mephitis*).

Pole Harvested Habitat

Pole harvested habitat consists of dense stands of young conifers, especially Douglas-fir. Common wildlife species found in this habitat include pacific tree frog (*Hyla regilla*), western skink (*Eumeces skiltonianus*), western terrestrial garter snake (*Thamnophis elegans*), dark-eyed junco (*Junco hyemalis*), Trowbridge shrew (*Sorex trowbridgei*), and bobcat (*Lynx rufus*).

Mature Harvested and Unharvested Habitat

A wide variety of wildlife species inhabit the mature forest stands (both harvested and unharvested), which include early, mid-, and late-mature seral stages. Mid- and late-mature forests provide habitat for amphibians such as clouded salamander (*Aneides ferreus*) and Pacific giant salamander (*Diacamptodon ensatus*). Reptiles such as northern alligator lizard (*Gerrhonotus coeruleus*) and sharp tailed snake (*Contia tenuis*) are commonly found in a variety of forest habitats. Bird species found in forests dominated by Douglas-fir include Steller's jays (*Cyanocitta stelleri*), northern flicker (*Colaptes auratus*), and Pacific slope flycatcher (*Empidonax difficilis*). Common mammals found in mature stands are Allen's chipmunk (*Tamias senex*), long-eared myotis (*Myotis evotis*), mountain beaver (*Aplodontia rufa*), gray fox (*Urocyon cinereoargenteus*), and black bear (*Ursus americanus*).

Old-Growth Habitat

Old-growth habitat provides a cool, moist environment for a variety of wildlife species, several of which can only find their nesting or foraging grounds within this habitat type. Moisture-loving animals, such as insects, amphibians, and mollusks, tend to thrive in old-growth forests (Schoenherr 1992). Banana slugs (*Ariolimax* spp.) and other detritus feeders are an important and conspicuous component of this habitat because they process organic material throughout the forest floor. Amphibian species commonly found include Pacific giant salamander, clouded salamander, California slender salamander (*Batrachoseps attenuatus*), and northwestern salamander (*Ambystoma gracile*). Common bird species include pileated woodpecker (*Dryocopus pileatus*), Vaux's swift (*Chaetura vauxi*), Swainson's thrush (*Catharus ustulatus*), varied thrush (*Ixoreus naevius*), and brown creeper (*Certhia americana*). Mammal species that depend on old-growth habitat include California red-backed vole (*Clethrionomys occidentalis*), red tree vole (*Arborimus pomo*), silver-haired bat (*Lasionycteris noctivagans*), and northern flying squirrel (*Glaucomys sabrinus*).

Riparian Forest Habitat

Riparian forest habitat provides food, water, and migration and dispersal corridors, as well as escape, nesting, and thermal cover for many wildlife species (Mayer and Laudenslayer 1988). Wildlife species associated with riparian forest habitat include black salamander (*Aneides lugubris*), tailed frog (*Ascaphus truei*), rubber boa (*Charina bottae*), and Anna's hummingbird (*Calypte anna*). Common mammals that could occupy this habitat include raccoon (*Procyon lotor*), spotted skunk (*Spilogale putorius*), and Virginia opossum (*Didelphis marsupialis*).

Migratory Birds

Of the approximately 900 migratory birds occurring in the United States, 122 were selected as species of management concern at a national level (chapter 2). Migratory bird species on this list that occur within the Reserve's coastal redwood forest habitat include hermit warbler, Vaux's swift, northern spotted owl, Allen's hummingbird, olive-sided flycatcher, and Pacific-slope flycatcher.

Special-Status Wildlife Species

Various information was gathered and reviewed to develop a list of threatened, endangered, candidate, and other special-status wildlife species that exist or could exist in the Reserve. Several data sources were reviewed to develop this list, including database records from the DFG's California Natural Diversity Database (CNDDDB) (2001), Survey-and-Manage species lists (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001), USFWS species lists (April 2001), PALCO's HCP (1999), published and unpublished literature, and results of protocol-level field surveys. Table 3-6 lists special-status fish and wildlife species with potential to occur in the project area and describes the federal and state status for the species identified. The table includes comments about the geographic distribution, habitat requirements, and range of the species. Two special-status, terrestrial species known to occur on the Reserve are listed as threatened or endangered: the marbled murrelet and the northern spotted owl. The following is a brief discussion of special-status species with the potential to occur in or near the Reserve.

Birds

Marbled Murrelet

Marbled murrelet populations in California have declined significantly (U.S. Fish and Wildlife Service 1997). At present, no concentrated marbled murrelet nesting populations occur along the California coast south of the Reserve until San Mateo County, south of San Francisco (U.S. Fish and Wildlife Service 1997). Scattered nesting occurs at Humboldt Redwoods State Park, on PALCO lands, at Alder Creek, near Fort Bragg, and in other locations. Approximately 25% of the marbled murrelet reproductive activity in the southern Humboldt region may occur in the Reserve (Ralph et al. 1997).

In its recovery plan for the marbled murrelet, USFWS recommends the maintenance and development of suitable habitat in relatively large continuous blocks, specifically including the Reserve, which is designated critical habitat for the species (U.S. Fish and Wildlife Service 1997). The Reserve currently contains suitable marbled murrelet nesting habitat in most of the intact old-growth and late mature stands present (2,115 acres) and in seed-tree and mature harvested forests (270 acres), together representing 32% of the Reserve. Under the critical-habitat designation, actions in the Reserve should not adversely affect marbled murrelet habitat. Suitable nesting habitat for the marbled murrelet is low elevation, mature to over-mature coniferous stands. Younger stands are also suitable for nesting if they contain large trees with nest platforms. Nest platforms include large branches, deformities, or debris platforms created by mistletoe infestations. The current range of the marbled murrelet in California is considered to be up to 45 miles inland from the coast (U.S. Fish and Wildlife Service 1997).

Disturbance near nests may interrupt normal breeding behavior and result in a failed nesting attempt. Such outcomes are especially onerous for species with a low rate of reproduction, such as the marbled murrelet. Protection of nesting marbled murrelets generally focuses on protecting suitable habitat and minimizing the potential for noise and visual disturbance that may adversely affect breeding birds. According to Long and Ralph (1998), however, anecdotal data supports the theory that nesting marbled murrelets are relatively tolerant of loud noises. They conclude that marbled murrelets are not easily disrupted from nesting attempts by human disturbance, except in situations where humans have confronted murrelets at or very near the nest. Hamer and Nelson (1998) preliminarily investigated the effects of several disturbance types on nesting activity. They found that human presence near a nest tree caused adults to abort feeding or flush from the nest limb. According to this research, visual human disturbance caused disruption in nesting

activity, while noise disturbance from human presence did not result in a reaction by adult nesting marbled murrelets.

A potential indirect effect that is perhaps more significant than disturbance is the risk of predation on marbled murrelet eggs and chicks. The only defense mechanism a nesting marbled murrelet has from predators is to remain hidden at the nest and to travel to and from the nest without being detected. Forests with trails and roads will alter bird community composition by enhancing forest-edge habitat used by generalist species and known nest predators, such as Steller's jays (Hickman 1990, Miller et al. 1998, Marzluff and Balda 1992, Nelson and Hamer 1995). Predation on marbled murrelets by corvids (birds in the family Corvidae, such as jays and ravens) has been documented by Singer et al. (1991). Furthermore, corvids are attracted to human garbage. An informal BLM survey of corvid abundance in the Reserve in 1999 indicated that Steller's jays were abundant and widespread in open areas and that four pairs of common ravens were detected (Hawks pers. comm.). Many rural residences and the towns of Fortuna (which has a waste disposal facility), Rohnerville, Fernbridge, Loleta, and Field's Landing are located near the Reserve, and general recreation and timber management activities take place in the area; therefore, the potential for corvid intrusion into the Reserve is significant.

Marbled murrelet nesting behavior has been identified at 47 of 72 survey stations in the Reserve (figure 3-6). Behaviors that indicate nesting activity include circling above and below canopy, flying through at or below canopy and stationary calling. Detections that do not indicate nesting activity include flying over canopy or nonstationary auditory detections. Nesting activity within the Reserve occurs primarily within the old-growth unharvested portions of the Reserve, but visual detections are often recorded in cleared areas and along roads because surveyor visibility is greater in these areas. Generally, the birds are travelling into the old-growth forests using drainages as corridors (Hawks pers. comm.).

USFWS estimates that activities within 0.25 miles of a marbled murrelet nest site may adversely affect nesting behavior (U.S. Fish and Wildlife Service 2000). Approximately 60% of the Salmon Creek watershed is within this distance of a marbled murrelet nesting site (approximately 900 acres), and 65% of the Upper South Fork Elk River (Elkhead Springs) watershed is similarly situated (approximately 290 acres). One such zone extends into the South Fork Elk River corridor. Another zone extends into the Lower Little South Fork Elk River watershed at its southernmost boundary. Thus, several of these disturbance-sensitive zones extend into the previously harvested portions of the Reserve (figure 3-6). Protocol-level surveys for marbled murrelet have not been conducted in the Lower Little South Fork Elk River watershed and the South Fork Elk Corridor; however, radar surveys on portions of the Reserve will be conducted in 2001.

Northern Spotted Owl

This species inhabits old-growth and late-successional forests in the Pacific Northwest and northern California. The survival of the owl depends on maintaining adequate well-distributed nesting, roosting, and foraging (NRF) habitat throughout the species' range. The components of NRF habitat include a multilayered, multispecies canopy with large overstory trees, large trees with various deformities, accumulations of fallen trees, and open space below the canopy for owls to fly (Thomas et al. 1990). Suitable dispersal habitat is also an important component of the owl's recovery because it provides a critical link to blocks of NRF habitat. Dispersal habitat consists of forest stands with adequate tree size and canopy closure.

The Reserve is within the California Coastal biogeographic subprovince in the range of the northern spotted owl and contains suitable NRF and dispersal habitat, as well as known nest sites and activity centers for the species. Protocol-level surveys from the last several years indicate

that five northern spotted owl sites occur in the Reserve. Five owl sites surveyed in 2001 revealed two that fledged young, one that was occupied by a single adult, and two with no detections. Approximately 4,666 acres of the Reserve (62%) is considered to be suitable nesting habitat (table 3-7). Fifty-one known owl nesting sites are located on land in Humboldt, Mendocino, and Trinity Counties managed by BLM's Arcata Field Office.

Table 3-7. Existing Suitable Nesting Habitat for Northern Spotted Owl and Marbled Murrelet in the Headwaters Forest Reserve*

Seral Stage	Northern Spotted Owl (acres)	Marbled Murrelet (acres)
Unharvested Forest		
Old-growth	1,948	1,928
Late-mature	434	187
Midmature	188	-
Midmature with predominant trees	230	-
Harvested Forest	-	-
Seed-tree harvested	443	249
Midmature harvested	794	21
Early-mature harvested	62	-
Early-mature harvested with predominant trees	92	-
Pole harvested	<u>186</u>	<u>-</u>
Total	4,666	2,385

* Criteria for habitat suitability are as follows:

Northern spotted owl: \$21" DBH, \$40% canopy closure.
Marbled murrelet: \$36" DBH, \$60% canopy closure.

A search of the CNDDDB and survey results from the BLM indicate that the known nest sites are within both unharvested old-growth areas and some mature harvested stands. Nest sites are within 0.25 mile of harvested areas in the Lower Little South Fork, South Fork Elk Corridor, and Upper South Fork Elk River (Elkhead Springs) watersheds (figure 3-7).

The current threat to spotted owl populations within the Reserve is the presence of at least three pairs of barred owls observed in or near the Reserve, which are able to outcompete spotted owls for habitat and available prey.

Bald Eagle

Nesting habitat for this species includes conifer forests (Zeiner et al. 1990) associated with a lake, river, or other large body of water. Nest trees are typically dominant or co-dominant trees in a mature or old-growth stand (Lehman 1979). Winter habitat for this species is generally large trees with open crowns near large creeks, rivers, or lakes that have an available supply of fish (Lehman et al. 1980). PALCO has conducted bald eagle surveys on the Reserve and adjacent lands. No bald eagles were observed, and no nesting activity is known or suspected to be occurring on or near the Reserve (PALCO 1999, U.S. Fish and Wildlife Service and California Department of Forestry and Fire Protection 1999).

Figure 3-6
Marbled Murrelet Nesting Survey Results
in the Headwaters Forest Reserve

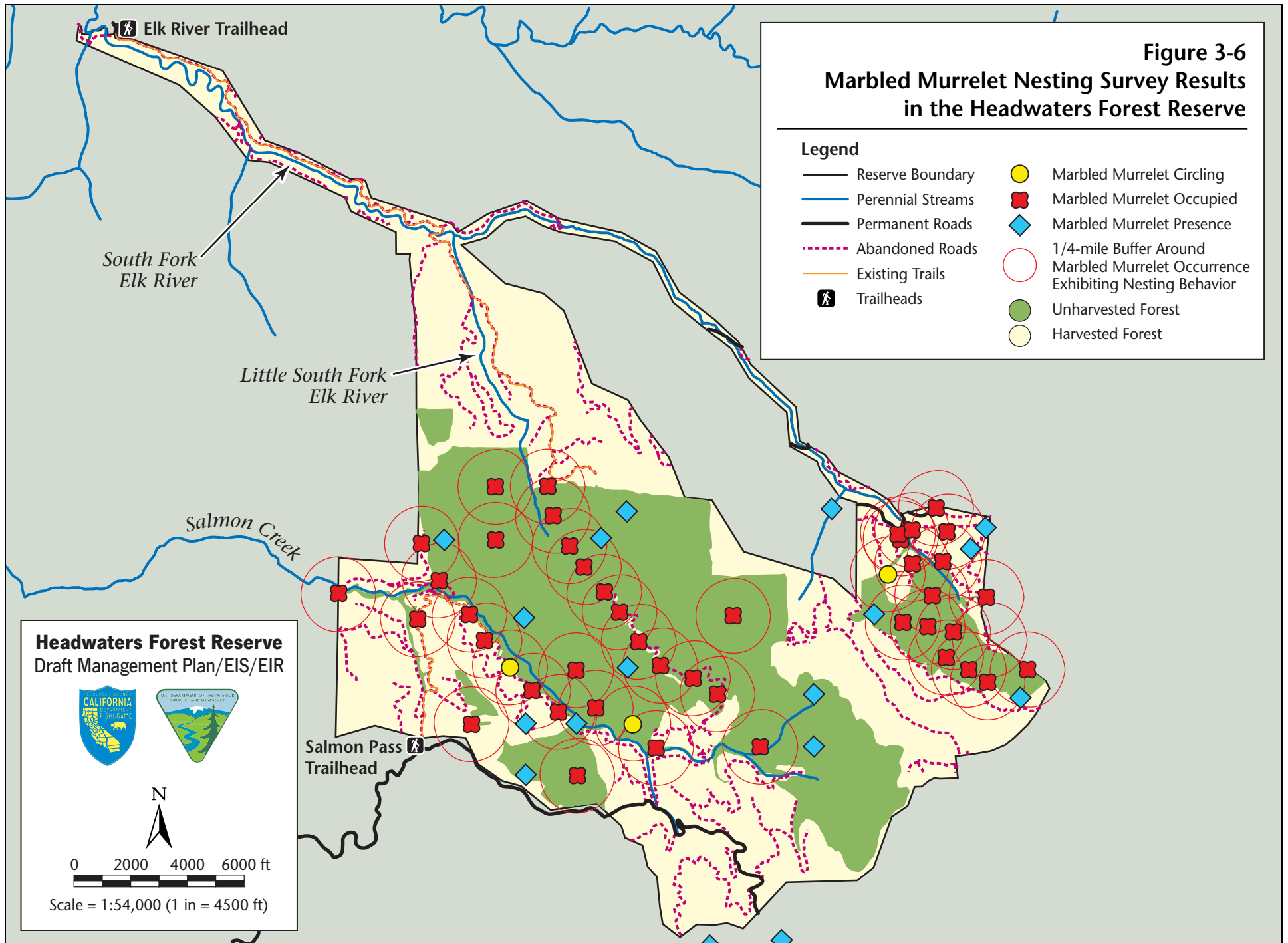
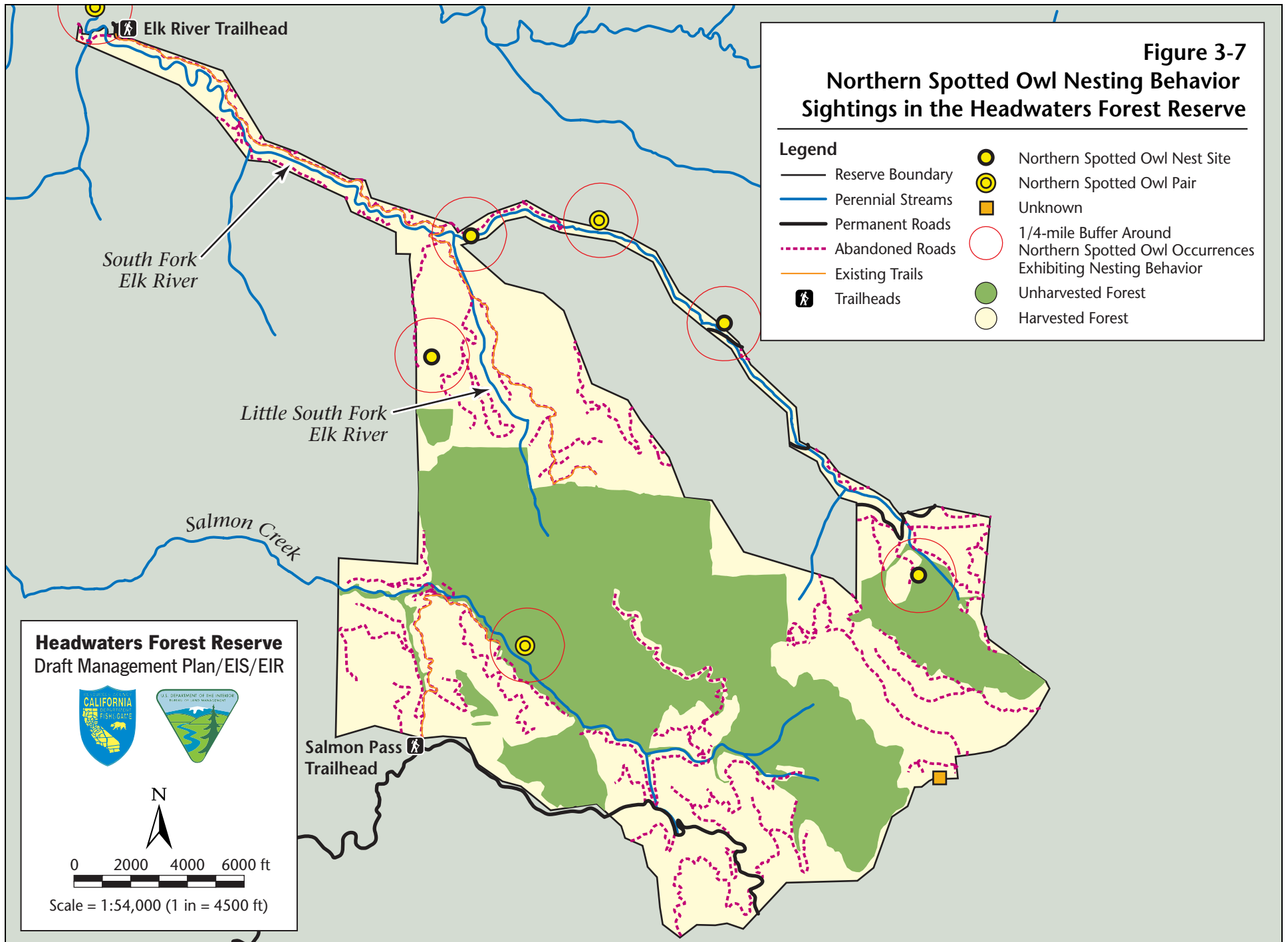


Figure 3-7
Northern Spotted Owl Nesting Behavior
Sightings in the Headwaters Forest Reserve



American Peregrine Falcon

This species nests on cliff ledges. They have been known to nest on small outcrops in other portions of their range (Zeiner et al. 1990). In 1999, PALCO conducted peregrine falcon surveys in the vicinity of the Reserve. As required by their HCP, surveys were conducted within 0.5 mile of timber harvest plans in suitable habitat. No peregrine falcons were observed at that time, and no nesting activity is known or suspected to be occurring on or near the Reserve. The species could occur irregularly during migration.

Osprey

The osprey population has substantially increased over the last 30 years. This species is always associated with large water bodies (e.g., lakes, reservoirs, large rivers) where the species preys on fish. Nests are usually within 1,000 feet of water but are occasionally as far away as one mile (Airola and Shubert 1981). Nest sites consist of a large stick nest typically constructed on the top of tall, broken-top trees or snags. Nest sites are usually in open forest habitats for easy accessibility (Zeiner et al. 1990). One known osprey nest occurs in the Reserve.

Little Willow Flycatcher

This species nests in wet meadows with abundant willows. Occurrences of the little willow flycatcher in the north coast are limited to the Six Rivers National Forest and along the Eel River (Sterling pers. comm.). It is suspected that these birds were not nesting but over-summering in the north coast area. Except for shrub-sapling harvested areas, the upland forested areas of the Reserve do not contain suitable nesting habitat for little willow flycatchers, but the riparian habitat in the Elk River Corridor of the Reserve does contain suitable habitat for migrating birds.

Amphibians and Reptiles

Southern Torrent Salamander

Southern torrent salamanders occur in seeps, springs, and high-gradient reaches of streams in coniferous forest habitats (Corkran and Thoms 1996). Southern torrent salamanders have been detected in the Reserve and on adjacent PALCO lands.

Northern Red-Legged Frog

This species inhabits permanent pools, marshes, and slow-moving streams with dense streamside vegetation (Stebbins 1972). This species is rarely observed away from streamside habitats and finds escape cover in water at least three feet deep. Permanent or nearly permanent pools are required for larval development. Northern red-legged frogs have been detected in the Reserve and on adjacent PALCO lands.

Foothill Yellow-Legged Frog

This species inhabits streams and rivers in woodlands, chaparral, and forests (Stebbins 1985). The species requires shallow, flowing water in small to moderate streams with at least some cobble-sized substrate (Hayes and Jennings 1988). The frogs have been found in streams without cobble (Fitch 1936, Zweifel 1955), but it is not known if foothill yellow-legged frogs live in such habitats regularly (Hayes and Jennings 1988). Suitable habitat for the foothill yellow-legged frog exists within the riparian portions of the Reserve, but this species has not been detected within the Reserve. The foothill yellow-legged frog has been detected regionally in the Eel and Van Duzen Rivers.

Tailed Frog

This species lives in fast, small, permanent forest streams with clear cold water. Darkly shaded shallow water with cobble or boulder substrates are important habitat components for survival and reproduction of the tailed frog. Adults can be found away from streams during winter rains

and occasionally on warm, humid cloudy days (Corkran and Thoms 1996). Presence of this species within the Reserve is well-documented (Fuller pers. comm.).

Northwestern Pond Turtle

The northwestern pond turtle is thoroughly aquatic, preferring the quiet waters of ponds, reservoirs, and sluggish streams (Stebbins 1985). This species leaves the water to bask on rocks or logs and to deposit eggs along the streambank or in adjacent uplands. Northwestern pond turtles may overwinter in upland sites, which may enable them to occupy creeks or waterways that dry out for several months each year. This species has been detected in or near major watercourses in Yager and Eel watersheds but not in the Reserve or on adjacent PALCO lands.

Mammals

Pacific Fisher

The Pacific fisher species inhabits intermediate- to large-tree seral stages of coniferous forests and deciduous riparian habitats with a high percent canopy closure. Hollow logs, trees, and snags are an important habitat component because fishers den in protected cavities (Zeiner et al. 1990). The BLM conducted Pacific fisher surveys in the Reserve using four bait/photo stations in 1999 and 2000. The Pacific fisher was not detected during these surveys (Hawks pers. comm.). Regionally, the Pacific fisher occurs throughout the Humboldt Bay region.

Survey-and-Manage Wildlife Species

The Reserve lies within the Northwest Forest Plan area requiring surveys for Survey-and-Manage mollusks (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001). These species are: Oregon shoulderband snail, Church's sideband snail, Shasta chaparral snail, and Tehama chaparral snail. Surveys were conducted where ground-disturbing activities are to occur for all Survey-and-Manage mollusks, at which time only one Survey-and-Manage mollusk species was found, the Papillose tail-dropper slug (*Prophysaon dubium*). As of January 2001, this species is no longer considered a Survey-and-Manage mollusk (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Surveys were also conducted for the Del Norte salamander, which is listed as a Survey-and-Manage Category "D" species. Suitable habitat for the Del Norte salamander includes talus slopes, rock outcrops, and rocky areas along riverbanks, road cuts, and road fill areas (Corkran and Thoms 1996). In addition, suitable habitat requires protection from sunlight by an overstory canopy that maintains cool, moist conditions on the ground. All road segments decommissioned on the Reserve to date were surveyed to protocol for this species prior to ground-disturbing activity, but none were detected.

Interim Management of Biological Resources

Species Preservation Management

Interim management for species preservation has several elements embodied in various program areas addressed by this plan:

- **Watershed restoration**—logging road and landing decommissioning, sediment reduction actions (installing water bars, road drainage improvements, elimination of water diversions),

and trail repair to reduced sediment yield, to protect and enhance stream habitats within and downstream of the Reserve.

- **Forest restoration**—limited to removal of invasive nonnative pampas grass along the southern access road and along the two open trails.
- **Recreation management**—sponsoring guided interpretive walks, addressing local school classes, hosting school field trips to engender concern and care of the Reserve's resources, controlling visitation to prevent disturbance to nesting marbled murrelets and spotted owls, watershed degradation, and other activities that threaten preservation of ecosystem integrity.
- **Research and monitoring management**—regulating scientific studies to minimize impacts of human intrusion into old-growth forests through a set of guidelines for researchers' behavior and by limiting their access seasonally and hourly to protect listed nesting species.

The watershed restoration work currently being conducted in the Reserve through fiscal year 2002 was approved under an existing environmental assessment (DOI BLM 2000) and biological opinions (U.S. Fish and Wildlife Service 2000, National Marine Fisheries Service 2000). Under the resulting biological opinion of July 12, 2000, issued by USFWS, incidental take was authorized on 792 acres of marbled murrelet nesting habitat between August 6 and September and on 445 acres of nesting habitat between September 1 and September 15, for one breeding season between 2000 and 2002.

At present no forest restoration density-management actions have been planned, approved, or carried out.

Watershed Restoration

Watershed restoration planning began shortly after the Reserve came into public ownership, resulting in a series of restoration planning documents (PWA 2000a, 2000b, 2001). Road and landing removal actions according to these plans commenced in summer 2000 and are continuing in summer 2001. These actions involve removal of the road into the primary old-growth grove and of six road segments adjacent to streams in the watersheds of both Salmon Creek and the Little South Fork Elk River. Full recontouring of these roads to near-original grade is the target level of restoration. In addition, sediment reduction actions are being undertaken on the Salmon Creek Road, which now serves as the Salmon Creek Trail, and extensive trail repairs are being conducted on the Elk River Trail, which was also formerly a logging road.

Research and Monitoring

The following elements are currently monitored:

- various ecological parameters as specified in PALCO's HCP (conducted by PALCO representatives), including radar and conventional surveys for marbled murrelets within the Reserve and on adjacent PALCO lands;
- high-risk sediment sources and watershed restoration site recovery;
- recreation activity, including magnitude and pattern of visitation and adherence to established rules regarding off-trail prohibition and discarding of food wastes;

- possible occurrences of Survey-and-Manage species before any watershed restoration activities; and
- northern spotted owl activity centers.

A corvid monitoring plan has also been developed to establish a baseline sample of corvid abundance within the Reserve. Surveys will be conducted before this management plan is implemented. The study will involve corvid surveys at point-count stations in the Elk River Corridor, Elkhead Springs area, Alicia Pass area, and Salmon Pass area and stations located in the interior of old-growth stands. Once a baseline has been determined, BLM will be able to use this population estimate for comparison to future monitoring results.

BLM is also providing funding for a study in Redwood National Park on the effects of human disturbance on nesting marbled murrelets. This study will not be conducted within the Reserve.

Fire Regime and Hazard

Natural Fire Regime

Fire in the cool, humid climatic environment in which the forest stands of the Reserve are located is not considered to be a major risk (Viers 1981 and 1982). Significant fire events in this regime apparently have a low frequency of occurrence. Wildfire occurred with an average frequency of 80 to more than 400 years in the forests of coastal Oregon prior to widespread European settlement (Morris 1934, Juday 1976, Morrison and Swanson 1990, Agee 1991 and 1993). Viers (1981) indicates that fires in natural stands here may have average return intervals greater than 500 years. Although lightning is considered to be an important potential source of ignition, the typically high humidity during storm events retards the ignition and spread rate of fire. However, because some management alternatives considered in this report would increase opportunities for fire ignition (public access) or fuel loading (forest restoration), it is important to further assess current fire risk.

Fire Risk

Two aspects of an assessment of current risk of stand-replacing fire (RSRF) are important for the Reserve: sources of ignition and conditions affecting spread of fire. In the Reserve, ignition can come primarily from two sources, lightning strikes and human presence. Postignition fire behavior is determined by a number of factors, including topography, wind speed and direction, and fuel condition, which includes fuel moisture, fuel loading, and fuel structure. A risk assessment for planning purposes can focus on human sources of ignition and topographic and fuel-load conditions affecting fire spread.

Ignition

Ignition can come from four sources: lightning strikes, off-Reserve burning, within-Reserve management activities using fire, and activities related to human use of the Reserve. As noted, most lightning strikes occur on ridge tops, and spread of lightning fire is only a risk during a relatively infrequent combination of extreme wind and dry fuel conditions during lightning

storms. At present and in the foreseeable future, management of the Reserve does not involve use of prescribed fire (except for pile burning in stand density management areas; see chapter 4).

Fire spreading into the Reserve as a result of off-site ignition is possible. The lands of the Reserve are not isolated topographically from potential off-site ignition sources; they are both upslope and upcanyon from non-Reserve lands. Such fires could result from four ignition sources off of the Reserve: lightning strikes, trash burning in rural residences, recreation activity, and forest management activity. These sources are difficult to affect through management of the Reserve.

Human-caused ignition by those approaching or using the Reserve is an important potential source of wildfire, and degree of public access is a key factor of risk. Ignition of wildfire along access roads is probably not a major threat, however. Only one road provides access to the southern perimeter of the Reserve from the normally locked Newburg gate. From the gate, 75% of the road up to the Salmon Pass trailhead is in a topographic position where it is separated from the Reserve by a ridge; therefore, fire burning through lower timberlands and reaching the Reserve boundary would tend to stall at the ridge top without having the upslope preheating effect and would tend to be controllable (although adverse wind conditions could negate this tendency). The remaining 25% of the road, the portion between the Salmon Pass trailhead and Alicia Pass, stays on the ridge top, with the Reserve lands to the north. Again, fires ignited on the ridge top would tend not to easily descend into the Reserve. Except for the Salmon Pass Trailhead, the portion of the road on the ridge top is not open to the public. This road actually continues on through the southern portion of the Reserve, where it is used only for private commercial log-haul purposes.

The existing Elk River Corridor Trailhead and trail constitute another zone where consideration of human-caused fires is important. This corridor is characterized by riparian vegetation along a river, and the adjacent conifer forest has been reduced in volume by past logging. It is situated in a topographic position that has elevated atmospheric humidity and fuel moisture. If ignition were to occur, spread rates would be relatively low. The existing wide trail provides good accessibility for fire suppression.

At present, no facilities for camping or cooking fires are provided in the Reserve, and fires are prohibited. Thus, the most significant threat of wildlife from ignitions within the Reserve is associated primarily with trail day use beyond the Elk River Corridor.

Spread of Fire

Slope position and condition of vegetation are the key factors affecting fire spread. Quantitative data about fuel loading and structure are not available for the Reserve, and standardized fuels models have not been developed. However, two key elements of fire spread that can be evaluated are the relative topographic position of various seral stages and general fuel condition based on seral stage.

Topographic Position

In general, fire ignited in vegetation in the lower third slope position starts relatively slowly, but because of generally elevated fuel moisture conditions it can burn uphill with increasing rates of spread and intensity. Fire ignited in the midslope position tends to have a greater rate of ignition success and immediate spread but less uphill slope distance is available for fire to gain momentum. Fire ignited on the ridge has the greatest initial success because of generally lower

fuel moisture and higher wind exposure, but rate of spread and intensity are usually low. For the existing trail system, approximately 5.43 miles, 84% of the total trail distances are in positions on the lower third of the slopes and 16% are on midslope and upper third positions (table 3-8).

Table 3-8. Topographic Position of Existing Trails

Trail	Trail Distances Relative to Slope Position (miles)			
	Lower 1/3		Upper 2/3	
Elk River Corridor	2.94		0	
Little South Fork Elk River	0.40		0.86	
Salmon Creek	<u>1.23</u>		<u>0</u>	
Total Distance	4.57		0.86	
Percent of Total Distance	4.57	84%	0.86	16%

Vegetation Condition

Typical stand conditions of three seral stages are considered to contribute to elevated RSRF. These stages are the shrub-sapling harvested, pole harvested, and seed-tree harvested. These stands have combinations of fuel-size-class distributions, fuel load densities, and structures (both vertical and horizontal) that promote fire. They have low canopy-base heights and high canopy-bulk densities that promote vertical fire development into crown fires. A total of 29% of the existing trail distance is in these stands. The remaining 71% is in stands having lower risk associated with stand fuel condition (mature harvested).

The mature harvested seral stage has widely varying characteristics, and the associated RSRF depends on the evolutionary stage of the stand. Generally, these mature seral stages include stands 30–80 years old. Natural processes of mortality, thinning, dominant tree emergence, and mosaic development are occurring to various degrees, and associated fire risk varies greatly as a function of shading, humidity, understory development, and vertical connectivity. In the early periods of development, these mature stands exhibit similar conditions and RSRF to the sapling/pole stands, and in the later periods they exhibit conditions more like old-growth stands, which generally have low RSRF.

The unharvested old-growth stands generally have high levels of shading, elevated fuel moisture, considerable rates of decomposition on the forest floor, and relatively low understory volume. They also lack vertical connectivity and are dominated by large fire-resistant trees.

Integration of Fire Risk

Table 3-9 presents for each seral stage

- a subjective fuels condition risk factor (1–5 rating, with five the highest),
- the distribution by two relative slope positions, and
- a resulting RSRF rating.

Table 3-9. Risk of Stand-Replacing Fire of Various Seral Stages and Topographic Positions

Seral Stage	Fuels Condition Risk Factor (1–5)	Total Acres	Lower 1/3 Acres	Risk of Stand- Replacing Fire	Percentage of Total Area	Upper 2/3 Acres	Risk of Stand- Replacing Fire	Percentage of Total Area
Shrub-sapling harvested	4	652	207	Moderate	3	445	High	6
Pole harvested	5	1,677	314	High	4	1,363	Extreme	18
Mature harvested	3	2,762	823	Low to moderate	11	1,939	Moderate to high	26
Seed-tree harvested	3	433	236	Low to moderate	3	197	Moderate	3
Unharvested old-growth	1	1,947	635	Low	8	1,312	Low	18

Table 3-10 summarizes the acreages of the Reserve having the various levels of fire risk. As shown, approximately 40% of the Reserve is characterized by low and low-moderate RSRF (primarily the unharvested old-growth stands) but almost 30% has high and extreme RSRF (principally the sapling/pole and shrub stands). The combination of the relatively high proportion of stands with elevated fuel-condition risk and the topographic position of these areas poses a significant threat of wildland fire.

Table 3-10. Summary of Existing RSRF at the Reserve

Risk of Stand-Replacing Fire	Area (acres)	Percent of Total Area
Low	1,947	26
Low to moderate	1,059	14
Moderate	404	6
Moderate to High	1,939	26
High	759	10
Extreme	1,363	18

The highest proportion of high and extreme RSRF are in the Salmon Creek watershed, where pole harvested stands are widespread. The Upper South Fork Elk River watershed has the next highest proportions because of the presence of both pole harvested and shrub-sapling harvested stands. The Lower Little South Fork Elk River has the least proportion of high and extreme RSRF, because of the widespread presence of the older mature harvested stands.

A major concern is the risk of spread of fire into the unharvested old-growth stands from adjacent high-risk stands (the pole and shrub-sapling seral stage stands and pole- and shrub-dominated openings in seed-tree harvested stands). Such stands could introduce fire from below into the old-growth at relatively high rate of spread and intensity. In the Upper South Fork Elk River watershed of the Reserve, however, the old-growth stands are fairly well protected because they generally occupy lower slope positions and the high-risk stands are either in small isolated patches or are located upslope of the old-growth. No trails enter this area of the Reserve. A permanent timber-haul road does cross this area, but it is not open to public use.

The central old-growth grove of the Reserve is significantly threatened on both the north and south by the presence of pole and shrub-sapling stands downslope. Trails enter both of these areas. Most of these stands are located on relatively –more –humid, northern-facing slopes. In the Little South Fork Elk River watershed, pole, shrub-sapling, and early mature stands border the old-growth downslope. In the Salmon Creek watershed, a large expanse of pole harvested stands and smaller areas of shrub-sapling stands and seed-tree harvested stands border the old growth. These stands are generally on northeast-facing slopes above the old growth that remains in the inner gorge of the creek and extends up the southwest-facing slope. In one central location, however, an unthinned pole stand approximately 100 acres in size extends across the inner gorge and up the south-facing slope for nearly ½ mile, presenting a high risk of fire intrusion into the adjacent old growth.

Visual Resources

The aesthetic or visual qualities of the Headwaters Forest are some of its most outstanding attributes. Natural landscapes of magnificent towering trees, clear streams, and rolling coastal mountains define the character of the core old-growth redwood forest. However, in some of the previously harvested areas, the landscape has reduced visual qualities. Sharp contrasts are created by road corridors, exposed soil, blocks of different height trees, etc., and reduce the visual qualities, particularly on the 1,550 acres that comprise the most recently harvested areas.

Cultural Resources

Known Resources

Eight archaeological sites have been located and formally recorded within the Reserve (Humboldt State University Academic Foundation 2001). Seven are historic period archaeological sites, and one is a prehistoric site; of the historic sites, one also has a reported but unconfirmed prehistoric component.

Two of the historic sites are very complex, with multiple features spatially associated in various loci. These include the *townsite of Falk and the Elk River Mill and Lumber Company*, with 14 major recorded loci, and *Maggie's Camp*, with three loci, both within the Elk River Corridor. The historic townsite of Scribner, founded before Falk, may have been a prehistoric campsite for indigenous people. Also within the Elk River Corridor is one of two linear historic sites, the complex *Bucksport and Elk River Railroad Company* system, a logging railroad.

A second linear historic site is a well-preserved segment of the *Old Military Trail*, built in the 1850s by U.S. troops stationed at Fort Humboldt. From Falk, it traverses the central old-growth grove of the Reserve along the ridgetop between Salmon Creek and Little South Fork Elk River and is suspected to exit the Reserve's southeastern boundary. It coincides with a recent jeep road and was most likely the route of a prehistoric Indian trail. The single prehistoric site recorded at the Reserve is located on the ridgetop adjacent to the trail and indicated prehistoric habitation.

Consultation with representatives of the Table Bluff Reservation Band of Wiyot Indians, the Bear River Band of Rohnerville Rancheria, and Blue Lake Rancheria has not revealed any sacred or traditional cultural places within the Reserve.

Resource Condition

All the historic sites within the Reserve have been disturbed by either natural erosion or human activity. Logging affected the Old Military Trail in the southeast portion of the Reserve, but in the old-growth grove, the trail is well-preserved and retains its integrity of place. Other disturbances include digging for old bottles and structure demolition by fire authorities. However, historic structures remain standing and retain historical integrity. The prehistoric site remains undisturbed.

Interim Management

Interim management of cultural resources at the Reserve has consisted of three elements:

- conducting the cultural resources survey noted above;
- developing interpretive information regarding the townsite of Falk and disseminating it to the public via trailhead interpretive signs, interpretive walks, and presentations in local schools; and
- patrolling historic structures and other sites to prevent vandalism.

Recreation Activities

Access to the Reserve

As noted at the beginning of this chapter, the Reserve is accessible year round by Elk River Road from the city of Eureka (6 miles) or seasonally for BLM tours by the Newburg Road connecting to the Felt Springs Road from the town of Fortuna (4 miles), both of which are situated on U.S. 101 in the Humboldt Bay area. The Elk River Road is a paved two-lane minor collector road, while the Newburg Road is a paved two-lane rural residential road with homes closely bordering the roadway. The Felt Springs Road is a private natural-surface, two-lane arterial log haul road. BLM has a public easement over this timber company road, which must be accessed through a locked gate. Graveled turnouts have been installed by BLM. Only motor vehicles are allowed on the road, and stopping is prohibited.

The Elk River Road, providing access to the northern portion of the Reserve, terminates at the Reserve Boundary where an improved parking area and trailhead (Elk River Trailhead) are located on Reserve property. The improvements include a graveled surface parking area, suitable for cars but not trailers, fencing to prohibit vehicles from entering the Reserve, an information kiosk, and temporary restrooms. A gate prevents public motor access beyond the trailhead.

Where the Felt Springs Road first reaches the ridge along the southern boundary of the Reserve at Salmon Pass, another trailhead—the Salmon Pass Trailhead—is located. Improvements are similar to those at the Elk River Trailhead. Public travel on the Felt Springs Road beyond this point is currently restricted, although the road continues to Alicia Pass along the same ridge, where additional public access is considered in this plan. The Felt Springs Road continues on into the southeastern portion of the Reserve, where it is used for timber management activities on adjoining private timberlands under an existing right-of-way.

Existing Trail Network

The former logging road into the northern portion of the Reserve now serves as the Elk River Corridor Trail. This trail extends up the South Fork Elk River with a gentle gradient for 2.9 miles through a narrow riparian corridor of the Reserve. The old road surface is paved for the lower half mile, after which it has a natural surface. Adjoining lands are private timberlands. Near the confluence of the South Fork and Little South Fork, the trail becomes the Little South Fork Elk River trail, which climbs steeply for 2.7 miles through harvested timberlands along a former logging road to near the edge of the main old-growth grove on the divide between Salmon Creek and Elk River. Off-trail hiking and access into the old-growth grove at this point are discouraged. Users must return as they came for a round-trip hike of 11.2 miles.

The Salmon Creek trail, formerly a logging road from the Felt Springs Road at Salmon Pass, provides access to the southern portion of the Reserve. The trail begins with a gentle slope but eventually descends steeply to the inner gorge of Salmon Creek, 1.3 miles from the trailhead. At this point the trail turns east and heads up the inner gorge of Salmon Creek for 0.6 mile, allowing continuous viewing of the southern edge of the main old-growth grove in the canyon bottom and on the opposite slope. Entry into the grove is also discouraged here, and users must return by the same route—a round trip of nearly four miles.

Interim Access and Use Limitations within the Reserve

In March 1999, interim management guidelines for the Reserve were published that allow for day-use pedestrian access only. They do not allow use of vehicles, (whether motorized and nonmotorized), possession of firearms, overnight camping, and equestrian use in the Reserve (*Federal Register* 1999). Trail use was made subject to seasonal closure during wet weather to minimize sediment yield and trail damage. The Elk River Trailhead is open to the public year-round, only during daylight hours, although use of the Elk River Corridor Trail may not be allowed during wet conditions. The Felt Springs Road and Salmon Creek Trailhead are open only to guided hikes. Activities along the Elk River Corridor and Little South Fork Elk River Trails are monitored daily by BLM back-country rangers, who are available to provide information and assist visitors. The interim guidelines also subject collecting of vegetation to a special use permit process.

Visitation and Visitor Preferences

Visitation and Use

A study of visitation to the Reserve was developed from information cards completed by 2,305 visitors who registered at the Elk River Trailhead between June 1999 and March 2000 (DOI BLM 2000). The survey revealed that 75% of all Reserve visitors were from Humboldt County. Approximately 12% and 10% were from the San Francisco Bay Area and Sacramento Area, respectively. Seventy-four percent of the visitors said it was their first trip to the Reserve, and 96% said they would return. Most of the visitor use occurred in June and July (monthly average was 356 hikers). Use declined during August–October (monthly average was 278 hikers), and the least use occurred November through March (monthly average = 151 hikers), which is the rainy season. This level of visitation is relatively light compared to visitation at state and national parks in the region; an average of only 12 persons per day used the primary access to the Reserve during the peak use season.

The majority of visitors to the Reserve only hike the Elk River Corridor Trail. Only 13% of visitors reported that they also hiked the Little South Fork Elk River Trail to the terminus near the main old-growth grove in the Reserve. The amount of hiking that visitors completed varied during the survey period, however; after October a higher percentage of people hiked shorter distances (0–3 miles). Visitors' primary reasons for visiting the Reserve included hiking, exploring, seeing old-growth forest, seeing the result of all of the attention and controversy of the Headwaters forest acquisition, showing it to friends and relatives, exercising, birdwatching, relaxing, and walking dogs (Humboldt State University 2000).

Visitor Preferences

A survey of the preferences of visitors to the Reserve was conducted from July to September, 1999 (Humboldt State University 2000). Reserve visitors were contacted on a stratified random sampling basis for onsite interviews and submittal of a mail-back questionnaire. Of the 580 persons contacted, 411 returned completed surveys (71%).

Only 8% of the respondents indicated they saw too many other hikers, indicating that lack of solitude was not an issue. Twenty-five percent of visitors said they noticed resource impacts caused by other recreationists, primarily litter and dog excrement. Twelve percent of visitors complained that the behavior of others interfered with their enjoyment; the most common problems cited were off-leash dogs and bicycles (bicycle use is in violation of the interim management policy for the Reserve).

When asked what problems they experience with the Reserve, 35% of visitors considered both the lack of information about the area's history and culture and the lack of additional trails to be major or moderate problems. Other problems considered to be major or moderate were the lack of information about trails (30%), litter (25%), trail erosion (21%), pets off-leash (19%) and human waste (17%).

When asked about the importance of services and facilities provided by the BLM, visitors rated the following as important or very important: trailhead signs having necessary information (85%), and opportunity for personal freedom (77%).

Visitors were asked about their support or opposition toward a list of possible management options and permitted activities. More than 90% of respondents support hiking, nature study, and wildlife viewing activities. A majority of visitors opposed hunting (88%), pets off-leash (64%), mountain biking (58%), and horseback riding (58%). A majority of visitors supported providing more trailhead parking (62%) and charging a small user fee (58%).

Suitability for Special-Area Designations

Some of the Reserve's lands and resources may qualify for special designation under certain federal and state laws or administrative regulations, including Area of Critical Environmental Concern/Research Natural Area (ACEC/RNA), Special Recreation Management Area, National Register of Historic Places, Wilderness Study Area, National Wild and Scenic River, and State of California Ecological Reserve. Each special-area designation has certain qualifying criteria. The characteristics of the Reserve germane to these criteria are discussed in *Designation and Management of Special Areas* in chapter 4. Evaluations of eligibility and suitability for

designation of Wilderness study areas and Wild and Scenic Rivers are presented in appendices G and H.

Socioeconomic Environment

Locally Affected Communities

Humboldt County

Humboldt County's economy developed around agriculture, logging and lumber milling, and ocean fishing. Its population has steadily increased, and the unemployment rate has decreased, over the past 20 years. Humboldt County has a current estimated population of 127,000, with a median age of 33. Retail trade now dominates local commerce, followed by health care, manufacturing, and accommodations and food service. The county's median per capita income is relatively low (\$20,500) compared to \$39,595 for California and \$33,300 nationally. Humboldt had a high unemployment rate of 6.3% in 1999 (compared with 5.2% in California and 4.2% nationally) (U.S. Census Bureau 2001), and the lowest labor wage rate (\$7.25/hour for a skilled employee) in 26 U.S. labor markets. Housing costs in Humboldt County are low for California but typical of the nation, with a median home price of \$142,000 (CICG 2001), (compared with a statewide median price of \$240,000 and a national median price of \$135,000) (McAllister 2000). The county government maintains an extensive road system throughout the county, which includes the two roads that provide access to the Reserve.

Eureka

Eureka, bordered on one side by Humboldt Bay and on the other by mountains, had its roots since the 1850s in the timber and commercial fishing industries. The city has 28,600 residents within 17 square miles. It is the county seat of Humboldt County. Colleges in Humboldt Bay area (but outside of the city) include College of the Redwoods south of the city and Humboldt State University in Arcata, a town of 16,000 residents eight miles to the north (Eurekaweb.com 2000).

City of Fortuna

The City of Fortuna covers approximately five square miles and is located 16 miles south of Eureka on U.S. 101. Fortuna is the largest city in Humboldt County south of Eureka and has a population of approximately 10,200. The area within the city limits is mostly residential, with the surrounding area predominately rural. Much of the employment in the Fortuna area is related to timber and agriculture. However, within the city the largest percentage of employment is in retail trade and manufacturing. Recreation and tourism also contribute significantly to the city's economy. Because of its location, the city has served as commercial center for the residents of southern Humboldt County, enabling the city to maintain a relatively stable economy and employment rate during seasonal fluctuations in the timber and tourism industries. (City of Fortuna, 1993)

Regional Recreation Opportunities

Humboldt County provides diverse recreation opportunities for its residents and visitors. Public recreation sites include beaches, rivers, and old-growth redwood forests (figure 3-8). Numerous parks offering a wide range of recreation opportunities are located within a 60-mile radius of the Reserve. The closest parks with stands of old-growth redwood are Grizzly Creek Redwoods State Park (15 miles east), Humboldt Redwoods State Park (30 miles south), and Prairie Creek Redwoods State Park and Redwood National Park (50 miles north). These parks provide a full array of recreation opportunities and facilities, including a combined total of 170 miles of trails. Much of the trail mileage traverses old-growth redwoods, allowing visitors to directly access some of the world's tallest and most impressive forests. In addition, all three parks offer camping and picnicking. Humboldt Redwoods and Prairie Creek offer backpacker/mountain bicyclist backcountry camps, and Humboldt Redwoods offers an equestrian camp. These parks have very high use compared to the Reserve, with a combined total of more than 1.2 million visitors annually.

During the scoping process for development of this plan, in addition to hikers, mountain bicyclists and equestrians expressed the desire for use of the Reserve. Off-highway vehicle users did not express a desire for use of the Reserve. Currently, 19 public recreation sites in Humboldt County permit equestrian recreation and 12 sites allow mountain bike use in the county. The extent, quality, and challenge of trails for these uses vary among these sites. Recreation use on private lands is generally prohibited without special permission. PALCO and Simpson Lumber Company, large landholders in the area, do not provide public access to their properties for any recreation uses without prior approval.

Information below is based on a telephone survey of managers of eight of these recreation sites to evaluate the quality of recreation experiences available to equestrians and bikers (table 3-11). Managers of the following sites were contacted in November and December of 2000: Clam Beach, Mad River Beach, Humboldt Redwoods State Park, Trinidad State Beach, King Range National Conservation Area, Sinkyone Wilderness State Park, Redwoods National and Prairie Creeks Redwoods State Parks, and Arcata City Forest.

Equestrian Opportunities

When asked to rate the availability of equestrian opportunities, managers from five of the seven sites indicated that their sites are underutilized by equestrians. Some of the sites are forest environments. Six of the sites are considered to have good or high quality riding trails and adequate parking for horse trailers. Five of the sites have direct trail access from offsite locations. The extent of trails on individual sites ranged from three miles to 50 miles, with a combined total of more than 178 miles between the seven recreation sites. Three sites have adequate watering sources, and three sites have plans to increase capacity, including the BLM King Range National Conservation Area and adjacent lands such as the Redwoods-to-the-Sea Corridor linking to Humboldt Redwoods State Park.

Mountain Biking

Managers of five sites also addressed the availability of mountain biking opportunities. All indicated adequate biking access from urban/suburban areas. Only one manager indicated his site was nearing capacity; the other four managers believed their sites are underutilized by mountain

bikers. Some of the sites are forest environments. The extent of trails on individual sites ranged from seven miles to 46 miles, with a combined total of approximately 146 miles. The quality of trails ranges from moderate to high, and the level of challenge ranges from easy to difficult. Four sites have plans to increase capacity, including the BLM King Range National Conservation Area.

Multiple-Use Trails and Recreation Conflicts

Interim management of the Reserve has limited recreation use to hiking, but mountain biking and equestrian uses are being considered in this plan. Multiple-use trails, while common, pose the potential for conflict among users. The most frequently mentioned conflict among the surveyed park managers in the region was between mountain biking and other users. Equestrian park visitors complain that the fast-moving bikes frighten horses and disrupt their recreation experience. Pedestrians complain of being surprised and feeling physically endangered by unexpected encounters with cyclists. These observations are not unique to Humboldt County, as they have been described in other areas.

Management Revenues

Existing Funding for Reserve Management

Fees are not currently charged for access to the Reserve, either for recreation access or research access. Funding from Reserve management is derived exclusively from Congressional appropriations to the Secretary of Interior for BLM. In the original budget for Reserve management submitted in 1997, the State of California was expected to contribute one third of the annual operation costs, but no state funds have been allocated to management of the Reserve yet. BLM has been providing \$1.2–1.3 million per year from federal appropriations for Reserve management since the Reserve's inception.

Federal/State Experiences with Recreation User Fees

Federal Fee Demonstration Program

In 1993, Congress enacted deficit reduction by passage of Public Law 103-66, the Omnibus Budget Reconciliation Act of 1993, which amended the Land and Water Conservation Fund Act of 1965. This fee legislation directed a number of changes in the BLM recreation fee program. In the 1996 Interior appropriations bill, Congress provided BLM the authority to establish a demonstration program to test the collection, retention, and reinvestment of new admission and users fees. This new Recreational Fee Demonstration Program allows BLM to use all of the fee income for meeting costs of operating the site where they are collected. As noted in chapter 2, the federal legislation that created the Reserve requires that the assessment of fees for recreation and research be considered in this management plan.

Fees charged to date under the demonstration program range from \$3 to \$5 for daily use/parking permits and typically are \$40 for seasonal passes. Visitation to BLM's 95 sites in the program in 1999 was relatively unchanged from visitation in years before the program began. All of the federal participating agencies report high public acceptance of the fee program. Approximately

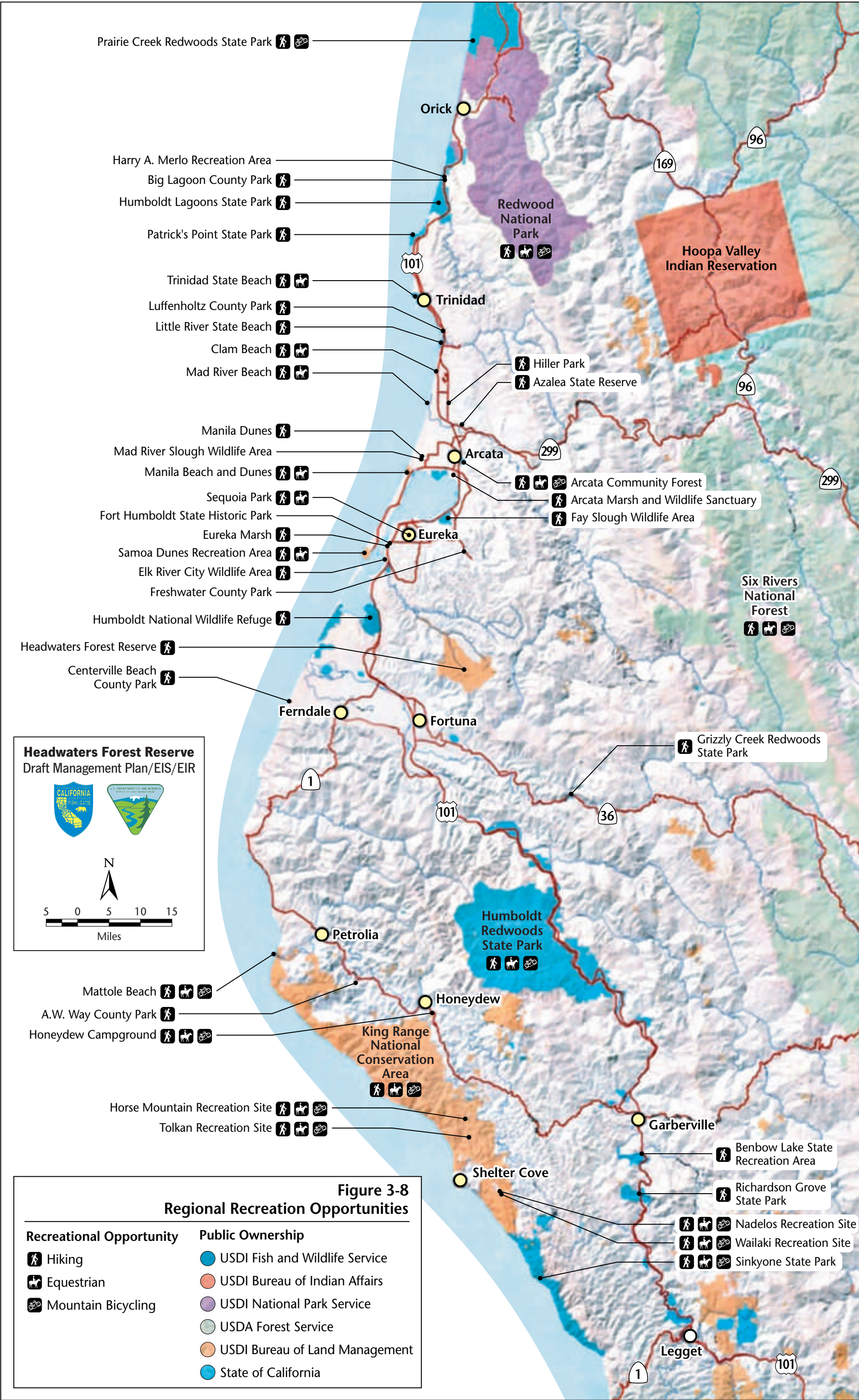


Table 3-11. Status of Regional Recreation Opportunities

Facility	Clam Beach and Mad River Beach County Parks	Humboldt Redwoods State Park	Trinidad State Beach	King Range NCA	Sinkyone Wilderness State Park	Redwoods National/Prairie Creek State Parks	Arcata City Forest
Equestrian Opportunities							
Suitable parking for horse trailers	Yes	Yes	Yes	Yes	Yes	Yes	No
Direct trail access from offsite locations	Yes	Yes	Yes	Yes	Yes	Yes	No
Quality of onsite riding trails	High	Good	Good	Average	Average	High	High
Extent of trails	7 miles	50 miles	3 miles	46 Miles	15 miles	49 miles	7.5 miles
Trail-use conflicts	Bikes vs. hikers and horses; dogs off leash	Horses vs. bikes	None	None	Horses vs. bikes	None	Horses vs. bikes, hikers vs. bikes
Suitable watering sources	No	Yes	No	Limited	Yes	Adequate	No
Use versus capacity	Underutilized	Moderate	Underutilized	Underutilized	Underutilized	Underutilized	Moderate
Plans for increasing capacity	No	Yes	No	Yes	No	Yes	Yes
Mountain Biking Opportunities							
Direct access from offsite locations	Yes	Yes	NA	No	No	Yes	Yes
Extent of onsite biking trails	7 miles	30–40	NA	46 Miles*	11 Miles	45 miles	10.5 miles
Quality of trails	Flat, paved	High (roads)	NA	High	Moderate (roads)	Moderate	High
Challenge of trails	Not challenging	Moderate to difficult	NA	Moderate to difficult	Moderate	High	High
Trail-use conflicts	Bikes vs. hikers and horses; dogs off leash	Horses vs. bikes	NA	None	Horses vs. bikes	None	Horses vs. bikes, hikers vs. bikes
Use versus capacity	Underutilized	Moderate	NA	Underutilized	Moderate	Underutilized	Moderate; nearing capacity
Plans for increasing capacity	No	Yes	NA	Yes	No	Yes	Yes
Contact	Bob Walsh	Don Beers, Dave Stockton	Don Beers	Robert Wick	Don Beers	David Bower	Staff of Arcata Department of Environmental Services

* An additional 50 miles are currently open but are in a Wilderness Study Area and would be closed to biking use if Congress designates this area as wilderness.

90% of visitor respondents to agency surveys said the level of fees is “about right” or “too low.” However, some recreation user groups, such as the International Mountain Bicycling Association and the Backcountry Horsemen of Washington, oppose user fees. They argue that public lands should be funded by taxes, that charging fees discriminates against low-income families and that, because of the program, recreation interests that generate the most income (OHV use, power boating) will take precedence over lower impact activities.

At some sites, BLM provides no-fee days for select groups, such as economically disadvantaged persons, educational institutions, and volunteers.

California State Park Fee Waiver Program

In 2000, California state parks reduced user fees by approximately 50% in an attempt to induce more visitation by low-income persons. It was estimated that fee reduction will increase attendance by 30% in urban areas and 10% in rural areas. Day-use fees were reduced from \$5 to \$2 in Humboldt-area state parks in July 2000. This reduction increased attendance at some facilities, such as Patrick’s Point State Park, which experienced a 40% increase in attendance, comprised primarily of surfers. Attendance at most other facilities—those with more general recreation activity—were relatively unaffected by the policy change (Wilbur pers. comm.).

Chapter 4. Management Goals and Direction



Chapter 4. Management Goals and Direction



Introduction

This chapter presents the proposed management direction for the Reserve that is common to, or independent of, the alternatives eventually selected. In providing detailed management direction, it also provides a framework for the consideration of alternatives.

Management policy in this chapter is given for nine program areas comprising management of the Reserve:

- preservation of old-growth species and habitat (species management),
- restoration of old-growth and aquatic ecosystems (watershed restoration and forest restoration),
- research management,
- fire management,
- management of recreation access,
- cultural resource management,
- designation and management of special areas,
- resource monitoring and evaluation, and
- management revenue.

For each program area, management policy is given in three parts:

- management goals, which include desired outcomes;
- management direction, which includes allowable uses and needed actions; and

- implementation guidelines, which will guide implementation of the management direction.

Primary Focus of Reserve Management

The federal legislation authorizing acquisition of the Headwaters Forest established a primary management goal:

“To conserve and study the land, fish, wildlife, and forests . . . while providing public recreation opportunities and [meeting] other management needs.”

This primary management goal for the Reserve is also reflected in agreements between the federal and state agencies that share management responsibility for the Reserve.

The *primary focus of Reserve management* is to restore and maintain its ecological integrity and to study its ecological processes so as to improve that management. Recreation and other necessary management activities will be constrained as necessary to be consistent with the primary goal.

The Headwaters Forest was acquired by the people of the United States to conserve a unique remnant of the old-growth coastal forest of northwestern California that was once extensive but is now limited to a few parks and reserves in the region. The Headwaters old-growth forest is unique among these remnants because of its mix of large redwood and Douglas-fir tree species in association with other conifer species and its diversity of understory species. Conservation of this old-growth forest requires that its natural ecological structure, functions, and processes be preserved in unharvested groves and restored in the harvested forests stands that were included within the Reserve.

Management of this old-growth reserve will involve identification of needed research and protection of

- native species from human and mechanical disturbance that may inhibit their abundance and recovery,
- natural vegetation from invasion of exotic plants and degradation from human intrusion,
- special-status native animals from exotic animals, and
- all resources from fire.

Restoration of ecological functions and processes of harvested forests will involve

- reduction in sediment movement from disturbed forests to streams;
- minimization of unnatural drainage patterns;
- acceleration of plant succession in timber harvested areas;
- improvement of structural complexity in harvested areas;
- improvement of old-growth buffers;
- eventual elimination of forest fragmentation; and
- to the extent practicable, elimination of exotic organisms.

To the extent that they do not compromise these primary goals of Reserve management, opportunities will be provided for access to recreation values and for research that will promote better reserve management.

Species Management

Management of threatened and endangered species, as well as management of the Reserve's plant, fish, and wildlife species in general, has several important elements: restoration of natural watershed condition and process, restoration of second-growth forests to achieve old-growth characteristics, control of visitation, management of wildland fire, and management of monitoring and research. Those management program elements are described in detail in the subsequent major sections of this chapter.

This section addresses aspects of those program elements that are directly related to preservation and recovery of important species that inhabit the Reserve. It sets forth restrictions on various types of disturbance activities that are required to avoid jeopardizing the continued existence of the threatened and endangered species and other special-status species that populate the Reserve. Special-status species that occur or may occur in the Reserve are shown in table 3-6 (in chapter 3). Threatened or endangered species include coho salmon, chinook salmon, steelhead trout, marbled murrelet, northern spotted owl, and bald eagle.

Management Goals

Management goals for the Reserve will focus on restoring and enhancing habitat for those species uniquely adapted to old-growth forests. Past timber harvest in the Reserve has resulted in fragmented habitat, which supports nonendemic, edge-tolerant species, as well as endemic, old-growth-dependent species. For this reason, species richness as a whole is not a good measure of management success for the Reserve (Verner 1986).

The desired outcome of species management in the Reserve is the continued presence of all existing old-growth-dependent species that comprise or use the Reserve's forests, streams, or riparian systems and an expansion of populations of these species consistent with the Reserve's gradually increasing carrying capacity as a result of watershed and forest restoration programs. The desired outcome includes provisions for recreation access to the Reserve at times and in locations that do not significantly adversely affect activities of old-growth-dependent species.

Accordingly, the following general management goals are established for species management in the Reserve:

- Protect all extant populations of old-growth-dependent fish, wildlife, and plant species that occur on the Reserve from activities that could threaten their individual or population survivability.
- Increase populations of old-growth-dependent species commensurate with the capacity of recovering old-growth ecosystems.
- Where practicable and consistent with the overall size of the Reserve and other management considerations, restore populations of native species.
- Meet the other species-specific goals described below.

Species-Specific Goals, Management Direction, and Implementation Guidelines

Management actions specific to each species or species group are presented in this section, following a species-specific goal.

Aquatic Species

Management Goals

The Reserve has high capacity for the long-term conservation of threatened anadromous salmonids in the north coast region. The desired outcome of management of the Reserve's aquatic habitats is the expansion of high-quality spawning, rearing, and migration habitat for anadromous salmonids, including coho and chinook salmon, steelhead, and coastal cutthroat trout. Over time, watershed restoration and forest restoration should create properly functioning aquatic habitat conditions, which are essential to protect, maintain, and enhance the current populations and genetic integrity of threatened anadromous salmonids. Protection and restoration of aquatic habitats and the processes that shape and maintain their watersheds will be the primary goal. This goal is consistent with the "Aquatic Conservation Strategy" objectives of the Northwest Forest Plan.

Management Direction

Timber harvesting in the Reserve has degraded salmonid habitats, primarily through sedimentation, removal of overstory cover, and interruption of the cycling of large woody debris (LWD). Watershed and forest restoration will reverse these cumulatively significant adverse effects. Roads and log landings and some skid trails will be decommissioned where practicable to reduce the amount of sediment discharged to the Reserve's aquatic habitats (see "Watershed Restoration"). Tree density management will accelerate the recovery of watershed cover and LWD cycling (see "Forest Restoration"). Careful consideration of the timing of watershed and forest restoration activities will avoid or minimize the potential for physically disrupting anadromous fish or contributing sediments to streams when key fish life stages are present.

The suite of proposed actions that will promote the recovery of fish populations includes

- reducing sediment input to streams by road and log-landing decommissioning;
- reestablishing connectivity of the stream network by eliminating present and potential future fish barriers at road crossings and, when appropriate, at existing debris jams;
- reducing sediment input to streams by accelerating restoration of dense watershed cover through tree density management;
- promoting conifer growth along riparian areas;
- in some instances, enhancing channel habitat complexity by installing in-stream habitat structures, in consultation with DFG; and
- precluding off-trail hiking and sportfishing within the Reserve.

Implementation Guidelines

The potential for direct and indirect impacts on fish and critical fish habitat during trail-system development and restoration activities will be avoided or minimized by use of implementation guidelines specified in “Management of Recreation Access” and “Restoration of Old-Growth and Aquatic Ecosystems” below. Those guidelines address trail construction and maintenance, and field implementation of watershed and forest restoration actions.

The guidelines of direct benefit to fisheries that apply to watershed and forest restoration and trail-system development actions are listed below.

- Soil-disturbing activities will not normally be permitted in the rainy period, October 15–May 1, to minimize the potential for delivery of sediment to streams from surface erosion or mass-wasting events. Furthermore, such activities will not occur during summer when rainfall exceeds 0.25-inch during a 24-hour period. In such cases, soil-disturbing activities will not resume until after the soil is no wetter than is found during normal dust-abatement watering or light rainfall and it is determined that the soil will not rut (is not saturated beyond its plastic limit) or pump fines (i.e., extrude fine sediment when weight is applied to the surface). However, soil-disturbing activities may be permitted to continue after October 15 on a case-by-case basis when fall rains are delayed. Similarly, activities may be initiated prior to May 1 following dry winters on a case-by-case basis when it is determined that soil conditions are no wetter than are found during normal dust-abatement activities or light rainfall and the soil will not rut or pump fines.
- Emergency sediment-reduction work (e.g., unblocking culverts, stabilizing failing slopes or road prisms) may occur during the rainy-season closure period if necessary to prevent culvert stream diversion, or slope failure from contributing massive volumes of sediment directly to watercourses.
- Nonemergency activities requiring heavy equipment use in, or disturbance to, stream channels (e.g., removing culverts and road fills, installing habitat structures, removing debris jams that block migrating fish) will be permitted only during June 1–October 15 but before the fall migration of adult fish.

Marbled Murrelet

Management Goals

The desired outcome for management of the marbled murrelet is to preserve existing nesting habitat and expand nesting habitat to the entire Reserve, exclusive of the Elk River corridor. This is also USFWS’s desired outcome for this species at the Reserve as established in its recovery plan for this species (U.S. Fish and Wildlife Service 1997).

Both short-term and long-term goals for management of the Reserve are established to achieve this outcome. Short-term goals are listed below.

- Increase reproduction and survivorship of the marbled murrelets within the Reserve. Detailed life history information and demographic data are scant for the marbled murrelet, but long-term bird counts and demographic modeling indicate a long history of population decline. Declining populations decrease the ability of the species to recover from random adverse events such as large wildfires and oil spills. A large productive population is more likely to have the resilience to withstand environmental uncertainties.

- Maintain and protect all forest stands that are occupied by marbled murrelets or stands that are considered suitable nesting habitat. It is more effective to protect existing habitat than to create new habitat. Factors of concern are fire, flood, disease, and windthrow.
- Maintain and protect all forest stands that provide physical buffers to the suitable stands although they do not provide suitable nesting habitat. Buffers are important in increasing the effectiveness of extant suitable habitat.

The following are the long-term goals:

- Increase stand size of late-successional and old-growth forests. Larger stands have a greater core area that is not degraded by the influences of edge effects (e.g. humidity, temperature, predator access).
- Connect isolated late-successional and old-growth forest stands.
- Increase acreage of forest containing interior forest conditions (i.e., not susceptible to edge effects).
- Regrow late-successional and old-growth forest over the largest amount of the reserve practicable.

On the scale of the Reserve, reaching the long-term goals would result in nearly doubling the amount of quality nesting habitat for marbled murrelet and increasing the viability of the murrelet population by reducing bird vulnerability to natural and human-caused catastrophes. Meeting the goals would also enable marbled murrelets to more easily avoid their predators because they could use their cryptic coloring and secretive behavior in a much larger area that would make them more difficult to detect. Restoration of large-tree, thick multiple-canopy forest stands would increase visual and auditory separation of murrelets from the potential disturbance of human activities.

These goals are consistent with the Marbled Murrelet Recovery Plan and the Northwest Forest Plan.

Management Direction

- Implement silvicultural practices on all earlier successional harvested stands practicable that accelerate development of the maximum amount of contiguous suitable marbled murrelet nesting habitat.
- Implement road closure and decommissioning actions on the maximum practicable acreage to reunite the largest possible number of isolated and fragmented late-successional and old-growth stands in the Reserve.
- Develop and implement a program to reduce fuel hazards within the Reserve.
- Maximize marbled murrelet productivity and survivability through
 - minimizing actions that may cause auditory or visual disturbances to marbled murrelets by judiciously buffering human activities and motorized equipment operation with distance, topographic screening or vegetative screening, and establishing seasonal and/or hourly operating periods as determined in consultation with USFWS; and
 - supporting continued research into murrelet disturbance to further quantify and refine auditory and visual disturbance parameters.

- Minimize the availability of human food waste and other trash, which may serve as a source of food for predators (specifically corvids) of marbled murrelets. Accomplish this through educating visitors and limiting human activities near marbled murrelet nesting habitat.
- Initiate corvid frequency monitoring to detect trends in areas of visitor use, in early-successional vegetation, and in old-growth core areas (optimum marbled murrelet occupied sites).

Implementation Guidelines

The management direction for management of marbled murrelet habitat will be achieved by use of the following guidelines.

- No suitable habitat for the marbled murrelet will be removed or degraded.
- All recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment will be buffered from marbled murrelet nesting habitat during the period March 24–September 15 by using vegetative screening or topographic screening and establishing seasonal operating periods or a distance buffer of up to 0.25 mile, as determined in consultation with USFWS.
- During the breeding season, visitor use in all areas of the Reserve, except for the Elk River Corridor, may be restricted to the period between two hours after sunrise and two hours before sunset.
- Signs will be posted at all trailheads and along trails near potential routes into the old-growth stands informing visitors that off-trail hiking is prohibited year-round.
- Information on the importance of not feeding corvids (or other wildlife) and removing all food wastes and other trash from the Reserve will be provided to visitors, researchers, and management personnel. To convey this message, informational signs will be posted at trailheads and informational brochures will be provided to researchers, monitors, restoration contractors, and annual visitation permit holders (if permits are required).
- Rangers will be present to monitor and enforce visitor compliance with seasonal and hourly closures, prohibition of off-trail hiking, and prohibition of discarding food waste and other trash and to remove any food wastes and trash encountered.
- Picnic sites (short pathways and picnic tables) will be limited to the Elk River corridor.

Northern Spotted Owl

Management Goals

The desired outcome for the threatened northern spotted owl is protection of existing habitat and expansion of suitable habitat for nesting, roosting, foraging, and dispersal habitat at the Reserve. This goal is consistent with the Northwest Forest Plan objectives to restore and enhance old-growth habitat within the range of the northern spotted owl. The recovery of this threatened species may depend on providing large, contiguous blocks of old-growth habitat. For this reason, management of the Reserve will contribute to the recovery of the species on a regional scale.

Management Direction

The above goal will be achieved by restoring old-growth forests in previously harvested stands and minimizing disturbance to nesting owls. The restoration of up to 1,080–2,757 acres (depending upon the selected alternative) of previously harvested stands (as noted above) and the natural succession of stands in older harvested areas will eventually provide owls with a significant increase in suitable nesting, roosting, foraging, and dispersal habitat. Observing limited operating periods and no-disturbance buffers will minimize potential for disturbance to nesting owls. Monitoring known owl sites and periodic surveys of the entire Reserve will help determine the response of owls to implementation of the plan.

Implementation Guidelines

The above management direction will be achieved by use of the following guidelines.

- No suitable habitat for the northern spotted owl will be removed or degraded during watershed restoration, forest restoration, or trail development.
- All recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment will be buffered from northern spotted owl nesting habitat during the period February 1–July 31 by use of vegetative screening or topographic screening and establishment of seasonal operating periods or a distance buffer of up to 0.25 mile, as determined in consultation with USFWS.
- Signs will be posted at all trailheads and along trails near potential routes into the old-growth stands informing visitors that off-trail hiking is prohibited year-round.

Bald Eagle and Osprey

Management Goals

The desired outcome for these special-status species in the Reserve is maintenance and restoration of suitable roosting habitat.

Management Direction

The above goal will be achieved by conducting surveys for bird occurrences incidental to other monitoring and management activities, protecting any identified nests from human and mechanical disturbance, restoring natural old-growth ecosystems, and restoring and protecting aquatic habitats, as previously described.

Implementation Guidelines

If nesting of the species occurs at the Reserve, restoration activities will not occur within 0.5 mile of any nest during the breeding seasons:

- for bald eagle, January 15–August 15 or until the young have fledged; and
- for osprey, February 1–August 1 or until the young have fledged, unless field evaluation by a qualified biologist indicates that topographic or vegetative screening, or the birds' responses to existing disturbance, indicate that a smaller buffer will be adequate.

Migratory Birds

Management Goals

The desired outcome for migratory birds with potential to occur in the Reserve is to maintain or enhance current levels of use. The following management goals are consistent with Executive Order 13186 for Conservation of Migratory Birds (January 11, 2001):

- Avoid and minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting forest and watershed restoration activities.
- Restore and enhance old-growth habitat for migratory birds.
- Prevent or abate pollution or detrimental alteration of environmental characteristics of benefit to migratory birds.

Management Direction

The above management goals will generally be achieved by restoring watershed and forest, observing limited operating periods, and restricting human access described for other species above. Appropriate site-specific alterations of planned actions will be made to minimize disturbance to nesting species, to the extent feasible. Ongoing monitoring of wildlife in the Reserve will provide information about changes in migratory bird use over time.

Implementation Guidelines

The deliberate removal of migratory bird nests during restoration activities is prohibited.

Amphibians and Reptiles

Management Goals

The desired outcome for special-status amphibians and reptiles in the Reserve is the restoration of aquatic and terrestrial habitat suitable for old-growth-dependent species. The southern torrent salamander, foothill yellow-legged frog, northern red-legged frog, tailed frog, and northwestern pond turtle are California state species of special concern and federal species of concern that potentially occur in stream habitats in the Reserve.

Management Direction

The above goal will be achieved by restoring natural ecosystems and avoiding disturbance to known populations during restoration implementation.

Implementation Guidelines

Disturbance of special-status amphibians and reptiles will be avoided to the extent practicable.

Survey-and-Manage Wildlife Species

Survey-and-Manage species refers to those species identified in the Northwest Forest Plan that because of rarity, endemism, or lack of information about the species might not be adequately protected by the broad-scale ecosystem approach of the Northwest Forest Plan (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Management Goals

The desired future outcome of Reserve management is expanded knowledge about the occurrence and habitat needs of these species and the expansion of suitable habitats for them.

Management Direction

Identified populations of Survey-and-Manage species will be considered during restoration or trail-construction activities. Larger-scale regional surveys (Strategic Surveys) and local extensive surveys for these species will continue to be conducted by BLM and annual results entered into a regional database for evaluation.

Implementation Guidelines

The Northwest Forest Plan standards and guidelines for Survey-and-Manage species contains management components for six categories of species. If any Survey-and-Manage species are identified in the Reserve, the appropriate guidelines will be applied (appendix B).

Special-Status Vascular Plant Species

Only one special-status vascular plant species, heart-leaved twayblade, has been identified in the Reserve. There is a low probability of identifying additional populations of special-status vascular plant species populations because of the types of habitats and the location of the Reserve. Many of the special-status plants with potential to occur in the Reserve specialize in nonforested habitats, such as meadows, seeps, bogs or fens, and therefore any found populations are likely to be highly localized to these specific habitats. Two Survey-and-Manage species, clustered lady's-slipper (*Cypripedium fasciculatum*) and mountain lady's-slipper (*C. montanum*) have potential to occur in the Reserve (see "Survey-and-Manage Species" below).

Management Goals

The desired outcome for the special-status vascular plants at the Reserve is maintained or increased species richness. Goals are to protect and monitor populations of identified special-status vascular plant species and to avoid adversely impacting identified populations as a result of other management actions.

Management Direction

The primary management direction is to identify and avoid or protect localized populations during management activities. In general, watershed restoration actions will take place on roads, trails, landings, and other previously disturbed environments. Maple-leaved checkerbloom (*Sidalcea malachroides*), a CNPS List 1B plant, tends to be associated with these disturbed habitats. Forest restoration activities will focus actions on thinning previously harvested stands in upland habitats. Several species, including mountain lady's-slipper, maple-leaved checkbloom, Siskiyou checkerbloom, Indian pipe, and leafy-stemmed mitrewort, have potential to occur in these habitats.

Watershed and forest restoration activities will accelerate the return of old-growth forest types in the Reserve. It is acknowledged that old-growth forest types do not provide suitable or preferred habitats for the special-status species with potential to occur in the Reserve.

Implementation Guidelines

The management direction for special-status vascular plant species will be achieved by use of the following guidelines:

- Extensive cryptogram and forest stand density surveys will be conducted for special-status vascular plants with potential to occur in the Reserve.
- The extent of identified populations will be mapped, population size will be estimated, and habitats will be described.
- Direct adverse effects on special-status plants will be minimized or avoided to the extent feasible through project design, location of project activities, and observance of buffer areas around identified populations.
- Impacts will be avoided on habitats (typically bogs and fens) occupied by western lily (*Lilium occidentale*).
- Guidelines for Survey-and-Manage species (clustered lady's-slipper and mountain lady's-slipper) specified in the 2001 NFP ROD (appendix B) will be implemented.

Survey-and-Manage Plant Species

"Survey-and-Manage" was developed in the Northwest Forest Plan as a mitigation measure for timber harvesting to provide additional protection for species that, because of rarity, endemism, or lack of information about the species, might not be adequately protected by the broad-scale ecosystem approach of the Northwest Forest Plan (U.S. Forest Service and U.S. Department of Interior Bureau of Land Management 2001).

Management Goals

The desired future outcome of Reserve management is compilation of more information about Survey-and-Manage species and protection of habitat for rare species and high-priority sites for uncommon species. The long-term goal is to meet stability and distribution objectives for these species.

Management Direction

Management of the Reserve will focus on restoring watersheds and old-growth forest habitats and maintaining or enhancing species richness. Survey-and-Manage species, by definition, are associated with old-growth forest habitats, and therefore management goals for forest stands will be consistent with Survey-and-Manage plant and cryptogram species richness in the long term. The standards and guidelines for Survey-and-Manage species contains management components for six categories of species. For any Survey-and-Manage species identified in the Reserve the appropriate guidelines will be applied (appendix B).

Surveys for the presence of Survey-and-Manage species will continue. To date, no vascular plant species, 24 fungus species, and three lichen species in the Survey-and-Manage category have been identified. It is considered a high probability that additional Survey-and-Manage species will be identified.

Implementation Guidelines

Extensive plot surveys will be conducted within the Reserve and on late-successional reserves managed by the Arcata Field Office. Strategic Surveys will continue to be conducted by BLM and USFS. All results will be entered into a regional database for evaluation. Future monitoring of Survey-and-Manage species populations will occur as needed.

Invasive Nonnative Plants

Management Goals

The desired outcome for the invasive nonnative plants in the Reserve is the absence of infestations. The goals are to eliminate all existing populations and to prevent the establishment of new populations.

Management Direction

The management goal will be achieved through an inventory and mapping of nonnative plant populations in the Reserve (to be conducted in 2001), establishment of a priority for removal actions, and implementation of weed removal.

To prevent the establishment of new populations of invasive nonnative plants, specific weed prevention measures will be taken during management activities, and public education and outreach will be used to enlist visitors to help in preventing infestations.

Implementation Guidelines

Following completion of weed mapping and inventory, direct removal of weed infestations will occur using hand tools. Herbicides will not be used. Sites targeted for removal will be prioritized based on degree of invasiveness, size of the population, and location adjacent to vectors or suitable habitats.

During restoration project implementation, appropriate practices for prevention of the introduction or spread of invasive nonnative plants will be employed, including

- using certified weed-free mulch and straw in watershed restoration actions, and
- using native seed mixes for watershed revegetation.

To minimize the potential for introductions of invasive nonnative plant populations into the Reserve by equestrians, education and outreach actions will be implemented. If an alternative is chosen that provides for equestrian use, visitors will be provided with information and recommendations for managing equestrian use in a manner that minimizes the potential for introduction of seed of invasive nonnative plants (see “Implementation Guidelines for Recreation Access”).

Restoration of Old-Growth and Aquatic Ecosystems

The restoration program for the Reserve is intended to restore natural ecological functions and processes of old-growth forests, riparian forest corridors, and aquatic habitats. Accordingly, the restoration program addresses both

- reduction of sediment from roads, landings, and skid trails, or other previously disturbed areas, to benefit coho salmon, chinook salmon, steelhead, and other aquatic species; and
- tree and shrub density management to nurture old-growth characteristics in previously harvested stands and watershed restoration sites to benefit marbled murrelet, northern spotted owl, and other species that depend on old-growth forests, as well as aquatic species.

Watershed Restoration

Management Goals

The desired outcome of management of the Reserve’s watersheds involves restoration of natural patterns of runoff and natural levels of sediment movement through watersheds and streams. Combined with the restoration of old-growth forest in timber-harvest areas (as described in the forest restoration section below), watershed restoration would re-create high-quality aquatic habitats in and downstream of the Reserve, to the benefit of endangered anadromous fish species and other aquatic organisms.

Consistent with the watershed restoration concepts of the Aquatic Conservation Strategy of the Northwest Forest Plan, the following goals are established, in the following sequence of priority, to achieve the desired outcome:

- Maintain aquatic refugia within undisturbed old-growth forest habitat by keeping those systems intact and ensuring that natural processes operating within those systems are left undisturbed. These intact areas would serve as core areas of optimal habitat.
- Restore affected watersheds that have the highest potential for restoration and would provide the maximum benefits for aquatic species. Adjacency to existing undisturbed old-growth systems or stream segments and public control over the majority of land in the watershed, are factors that further elevate priority. These watersheds would serve to expand the size and effectiveness of core areas of optimal habitat.
- Continue watershed maintenance of the corridors along the main South Fork Elk River to reduce sediment inputs to the river. Because uplands are not in public control, effectiveness of more extensive watershed restoration treatments there would be limited.

Management Direction

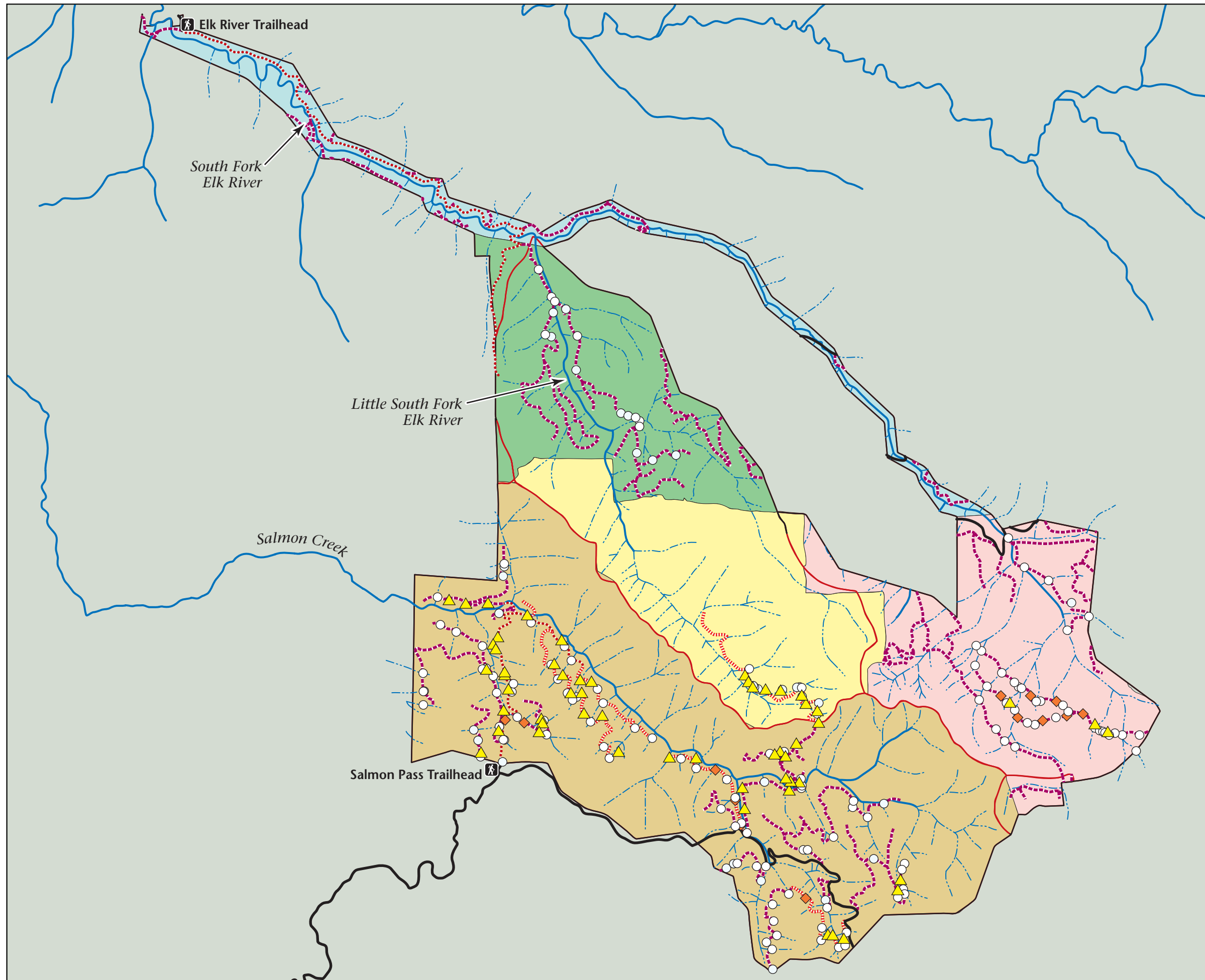
Watershed Restoration Actions

Watershed restoration will involve decommissioning roads, log landings, and to the extent practicable, skid trails in the Reserve that are contributing or have the potential to contribute significant amounts of sediment to the Reserve's aquatic habitats. Work will include roadbed decommissioning, full excavation of stream crossings, and slope stabilization. Actions will include complete removal of culverts or Humboldt crossings, involving complete removal of fill material at stream crossings, decompaction of road surfaces by ripping, and, depending on the selected alternative and available funding, moving road fills into road cuts to recontour the surface to preroad conditions. The use of heavy equipment such as excavators, bulldozers, backhoes, and dump trucks will be required. Activities will be limited to minimize disturbance where adjacent to marbled murrelet habitat and to minimize sedimentation in streams. Projects can be cleared for northern spotted owls through surveys or limited operating periods where necessary. Vegetation that has colonized these roads and must be removed for these actions will be used to mulch the finished soil surfaces.

Table 4-1 and figure 4-1 indicate the extent of work that will be required to eliminate the significant sources of sediment in each of the Reserve's watersheds, according to an inventory of high yield sites (PWA 2000a, 2000b, 2001). Conditions in each of these watersheds were described in chapter 3, "Affected Environment (Environmental Setting) and Interim Management of the Reserve)."

Other actions related to watershed restoration include road-to-trail conversion, trail repair, and emergency sediment reduction actions. Guidelines for trail construction appear in the Recreation Access section. Trail repair will include replacement of culverts, ditch cleaning, surface shaping, and rock surfacing. The use of backhoe, motor grader, dump trucks, and all-terrain vehicles will be required. Emergency sediment reduction includes cleaning culverts, removing culverts, constructing waterbars, constructing rock-armored swales, moving landslide material to a stable location, and applying weed-free mulch. Such emergency work may be done in the winter rainy season.

Figure 4-1
Proposed Watershed Restoration
in the Headwaters Forest Reserve



Legend

- Reserve Boundary
- Perennial Streams
- - - Intermittent and Ephemeral Streams
- Watershed Boundaries
- Permanent Roads
- Roads Proposed for Decommissioning
- Roads Being Decommissioned
- Roads Being Converted to Trails

Management Units

- South Fork Elk River Corridors
- Upper South Fork Elk River (Elkhead Springs)
- Salmon Creek
- Upper Little South Fork Elk River
- Lower Little South Fork Elk River

Sites

- Landslides or Fill Failures
- Other Sediment Sources
- Stream Crossings

Note:

Data shown on this map are preliminary and subject to change. Data for Lower Little South Fork Elk River and Upper Little South Fork Elk River are from sampling surveys and are therefore incomplete.

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



0 2000 4000 6000 ft

Scale = 1:39,000 (1 in = 3250 ft)

Table 4-1. Extent of Road Decommissioning Needed in the Reserve

Watershed	Number of Roads	Total Road Length (mile)	Number of Stream Crossings	Number of Land-slides	Number of Other Sites	Total Earthwork Volume ^b (KCY)	Total Disturbed Area ^b (acre)
Upper Little South Fork Elk River	1	0.89	3	8	0	31.7–53.0	12–15
Salmon Creek	24	14.74	50	22	2	383.8–542.9	181–201
Upper South Fork Elk River (Elkhead Springs)	18	9.60 ^a	48 ^a	8 ^a	7 ^a	139.2–385.2	77–89
Lower Little South Fork Elk River	<u>19</u>	<u>9.9^a</u>	<u>20^a</u>	<u>8^a</u>	<u>0^a</u>	<u>77.8–261.4</u>	<u>71–79</u>
Total	62	35.13	122	49	10	632.4–1,242.5	341–384

Note: KCY = thousands of cubic yards

^a Estimate, based on sample of watershed

^b Range is for hydrologic decommissioning to full recontouring (thousands of cubic yards)

Source: PWA 2001.

Watershed Restoration Priorities

The factors determining priority of areas to be treated are

- the need to keep largely undisturbed old-growth forests intact as core habitat areas,
- adjacency to old-growth,
- the amount of old-growth/second-growth components,
- existing range of anadromous fish,
- the ability to control upland effects such as sedimentation,
- expediency of treatment, and
- effectiveness of treatment.

Accordingly, as summarized in table 4-2, area priorities for watershed restoration actions are

- Priority 1: Upper Little South Fork Elk River watershed—completing restoration of the Headwaters Old-Growth Road;
- Priority 2: Salmon Creek watershed;
- Priority 3: Upper South Fork Elk River watershed (Elkhead Springs area);
- Priority 4: Lower Little South Fork Elk River watershed; and

- No Priority: South Fork Elk River corridors. (The Elk River Road will undergo hydrologic stabilization and conversion to a trail, followed by annual maintenance to minimize sediment yield.)

As described in the Forest Restoration section below, these area priorities apply to both the watershed restoration and forest restoration programs. Future funding constraints will determine how rapidly sites in various priority areas are treated.

Table 4-2. Factors Determining Priority of Watersheds for Watershed Restoration

Priority	Watershed	Adjacency to Old-Growth ^a	Second-Growth Component ^b	Occupied by Anadromous Fish Species ^c	Control of Upland Effects ^d	Expediency ^e	Effective-ness of Treatment ^f
1	Upper Little South Fork Elk River	Within	Negligible	No	Yes	Very high	High
2	Salmon Creek	Within and immediate	Moderate upslope	Yes	Yes	High	Very high
3	Upper South Fork Elk River (Elkhead Springs)	Within and immediate	Large component	Yes	Yes	High	Moderate
4	Lower Little South Fork Elk River	None	All	Yes	No	Moderate	Moderate
None	South Fork Elk River Corridors	None	All	Yes	No	Moderate	Moderate

^a Describes where old-growth stands that have not been entered can be found within the watershed in relation to the drainage mainstem. "None" indicates that the watershed does not have any old-growth stands that have not been entered.

^b Describes extent and location of entered second-growth component within the watershed.

^c Indicates whether watershed is occupied by anadromous fish.

^d Indicates the extent of control of watershed effects such as tributary inputs or potential sediment sources.

^e Relative ease or ability to fully implement.

^f Relative effectiveness of a fully implemented restoration program in the watershed.

Watershed Restoration Intensities

Two treatment intensities of Priority 1–4 sediment-yielding sites are feasible: "hydrologic stabilization" or "full recontour" to natural configuration.

- Hydrologic Stabilization includes full excavation of stream crossings to original channel configuration to approximate natural channel conditions; excavation of unstable fillslopes; storing excavated material in stable locations away from streams; and providing permanent surface drainage for the remainder of the road through ripping (decompaction), construction of cross road drains, and partial outsloping.

- Full Recontour includes full excavation of all stream crossings with 2:1 side slopes; swale excavations with 2:1 side slopes; and spoil allocation or disposal to reestablish to the maximum extent possible original topography and channel morphology.

The choice of the preferred intensity for watershed restoration in the Reserve, if adequate funding is available, including relative earthwork volumes and costs, is addressed in chapter 5, “Management Alternatives.”

All treated areas will be mulched with native vegetation uprooted during the road-decommissioning process and scattered on top of the disturbed soil. In addition, rice straw will be used near watercourses, seeps, springs, and other areas as necessary to reduce the amount of surface erosion possible during the first two rainy seasons. Future management of revegetation is addressed in the Forest Restoration section below. Watershed restoration will not constrain future trail location, although, in some cases, trails may be constructed along alignments similar to existing roads.

Implementation Guidelines

Detailed implementation plans for some of the required treatments, and estimated needs in other areas, are given in reports prepared by PWA (2000a, 2000b, 2001).

The following operational guidelines will apply to watershed restoration actions:

- All recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment will be buffered from marbled murrelet and spotted owl nesting habitat during the periods March 24–September 15 and February 1–July 31, respectively, by use of vegetative screening or topographic screening and establishment of seasonal operating periods or a distance buffer of up to 0.25 mile, as determined in consultation with USFWS. All guidelines are subject to consultation with USFWS.
- Disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow, will be minimized.
- Vegetation will be lopped and scattered on treated road surfaces to prevent rainfall from directly affecting soils until planted vegetation is extensive. Stems will be placed in the downslope direction.
- Sidecasting will be restricted as necessary to prevent the introduction of sediment into streams.
- New culverts, bridges, and other stream crossings will be constructed and existing structures will be maintained to accommodate at least the 100-year flood, including associated bedload and debris. Crossings will be constructed and maintained to prevent diversion of streamflow out of channels and down the trail or road surface in the event of a crossing failure.
- Fish passage will be provided and maintained at all road crossings of existing and potential fish-bearing streams.
- All feasible techniques will be used to prevent any sediment from entering a drainage system during road restoration/rehabilitation work. Heavy-equipment operators with experience in watershed restoration will be sought. A BLM project inspector, or designee, should be onsite during operations to ensure that proper procedures are followed.

- Heavy equipment will be inspected daily to check for fluid leaks. Equipment that leaks lubricants or fuels will not be used until leaks are repaired. Refueling should be done outside of riparian reserves and away from stream crossings. A spill plan should be available to onsite personnel.
- Interpretive guides will be instructed to make radio contact with heavy equipment operators to warn of presence of visitors.
- Truck speeds will be limited to 10 mph where visitors may be present.
- All restoration personnel will be briefed on the importance of not discarding food scraps or refuse or attempting to feed wildlife.

Forest Restoration

Management Goals

The Reserve has extremely high capability for rapid growth and development of large trees. The desired outcome of management of the Reserve's forests involves restoration of old-growth characteristics throughout the nonriparian areas of the Reserve. Together with the restoration of natural watershed conditions, as described in the watershed restoration section above, forest restoration would recreate high quality habitats on the Reserve to the benefit of threatened marbled murrelet and northern spotted owl, other terrestrial wildlife, nonvascular plants of old-growth forest understory, threatened anadromous fish, and other aquatic organisms.

Marbled murrelet and northern spotted owl depend on certain structural attributes of forest stands and individual trees for important phases of their life cycles. Attributes to be restored are large, continuous stands of large trees that have decadent and deformed, closed, multi-layered canopies. Very large trees with thick crowns and large lateral limbs and deformities, which will develop with increasing stand age and decadence, will provide important habitat niches such as nest site platforms, nesting and roosting cavities, and overhead protection from predators.

Consistent with the habitat restoration concepts of the Northwest Forest Plan, goals for forest restoration give first priority to maintaining and restoring the integrity of existing old-growth forest stands, followed by actions to expand these habitat beyond existing core areas. The following goals are established to achieve the desired outcome:

- Maintain undisturbed old-growth forest habitat by keeping those systems intact and ensuring that natural processes operating within those systems are left undisturbed. These intact areas would serve as core areas of optimal habitat.
- Restore second-growth forests to achieve old-growth characteristics. Adjacency to existing undisturbed old-growth systems further elevates priority. This restoration would serve to expand the size and effectiveness of core areas of optimal habitat. The results of restoration will be
 - ❑ accelerated rate of succession among forest seral stages,
 - ❑ created continuity between old-growth and other seral stages as they advance successionaly,
 - ❑ restored structural diversity of the second-growth stands, and
 - ❑ enriched species composition of the second-growth stands.

- Eliminate invasive nonnative plants from the Reserve.

Management Direction

An extensive body of research has shown that stand structure characteristics become established at an early stand age and that the restoration of old-growth forest ecosystems in previously harvested stands can be accelerated through manipulating tree density. By providing appropriate spacing early in stand development, crown formation and growth rates will be dramatically improved. Stand density manipulation will be used to achieve old-growth forest attributes within shorter timeframes than in unmanaged stands. Some unmanaged stands may never attain desired old-growth characteristics due to the deleterious effects of high density on crown development and growth rates.

Forest Restoration Actions

Restoration actions will involve stem-density management (tree thinnings) and tanoak control in shrub-sapling stands and sapling-dominated openings in seed-tree harvested stands, and perhaps in pole stands and pole-dominated openings in seed-tree harvested stands (see chapter 5, “Management Alternatives”), which are the result of prior timber harvesting. First priority will be given to revegetating watershed restoration sites in old-growth areas (i.e., the Headwaters Old-Growth Road) and to treating harvested stands with old-growth remnants (i.e., stands harvested with seed-tree retention prescriptions). Harvested stands comprised of early-mature and older seral stages (i.e., stands having average stem diameters over 12 inches) will generally not be treated because thinning would create unacceptable fuel loading or require road development for biomass removal. Though maintaining growth, thinning in older stands does not significantly affect tree and stand characteristics, as these attributes have already been established. For these reasons, a more intense forest restoration alternative, in which density management would be carried out in all previously harvested stands (high-intensity forest restoration), has been eliminated from detailed consideration (appendix J).

Forest restoration objectives for each seral stage, including related management issues, are shown in table 4-3. Objectives to be incorporated into restoration prescriptions include

- reducing stem densities to accelerate growth rates and succession into early- and mid-mature stages and to create more diverse and healthy stand structures;
- developing stand structure to soften the spatial transition from old-growth to second-growth stands (i.e., reduce wildlife-related edge effects, such as elevated temperatures, lowered humidity, increased predator access, and increased con-specific [same species] competition);
- reestablishing continuous forest canopy in harvested stands with old-growth remnants;
- nurturing connectivity between old-growth stands; and
- establishing new stands on disturbed sites, which are primarily watershed restoration sites.

Table 4-4 indicates the extent of seral stages in each watershed area that may be treated. Forest seral stages in the Reserve were described in chapter 3, “Affected Environment (Environmental Setting) and Interim Management of the Reserve.”

Forest Restoration Priorities

Factors determining the level of priority of areas to be treated are related to the potential to restore ecosystem integrity. The factors include

- fragmentation of existing forest,
- presence of seed-tree harvested areas containing legacy or residual old-growth trees with shrub- and sapling-dominated openings,
- presence of sapling and pole stands,
- adjacency to old-growth,
- expediency of treatment, and
- effectiveness of treatment.

Priority is highest for watersheds having the least fragmented old-growth forests: Upper Little South Fork Elk River watershed, the Salmon Creek watershed, and the Upper South Fork Elk River watershed (Elkhead Spring area), in that order. In these areas, priorities are highest in gaps in the existing old-growth forest, along edges of old-growth forest, and in areas that will eventually reconnect major existing stands of old-growth. Subject to these landscape priorities are the following treatment priorities, which are based on seral stage:

- **First priority**—Seed-tree harvested stands (stands with remnant old-growth trees interspersed with shrub/sapling openings and pole stands),
- **Second priority**—shrub-sapling harvested stands (most-recently harvested stands now dominated by shrubs and saplings), and
- **Third priority**—pole harvested stands (older harvested stands now dominated by pole-sized second-growth trees).

Sites disturbed during watershed restoration activities will also be given high priority for action, which will include revegetation and subsequent density management through sapling and pole stages.

In summary, as shown in table 4-4, area priorities for forest restoration actions are in the following order.

- **Priority 1:** Upper Little South Fork Elk River watershed—completing restoration of the Headwaters Old-Growth Road.
- **Priority 2:** Salmon Creek watershed—watershed restoration sites, seed-tree harvested, shrub-sapling harvested, and pole harvested stands.
- **Priority 3:** Upper South Fork Elk River watershed (Elkhead Springs area)—watershed restoration sites, shrub-sapling harvested, and pole harvested stands.
- **Priority 4:** Lower Little South Fork Elk River watershed—watershed restoration sites, shrub-sapling harvested, and pole harvested stands.
- **No Priority:** South Fork Elk River corridors (primarily riparian zones).

As described in the Watershed Restoration section above, these area priorities apply to both the watershed restoration and forest restoration programs. Future funding constraints will determine

Table 4-3. Forest Restoration Objectives by Seral Stage

Seral Stage	Definition	Objectives	Management Issues
Disturbed	Watershed restoration sites where recent ground disturbance has resulted or will result in removal of vegetation.	Establish and nurture new forest stands emphasizing species richness.	Highly accessible and easily manipulated.
Shrub-sapling harvested	Sites of most recent clearcuts with tree diameters from 0.1 to 8 inches and typically less than 15 years of age.	Reduce sapling density to establish high-growth rates and extensive crown development as stands advance into pole harvested stage.	Highly accessible and easily manipulated. Density management results in major growth increases and optimum stand structure development (most efficient stage for density management). Residue fuel hazard is short term.
Pole harvested	Sites of older clearcuts with tree diameters from 8 to 12 inches and typically from 15 to 30 years of age.	Reduce density to accelerate succession into early- and mid-mature stages and to create more diverse and healthy stand structures. Develop stand structure to soften the spatial transition from old-growth to second-growth stands (i.e., reduce edge effects) and to nurture connectivity between old-growth stands.	Requires more logistical planning for access and manipulation. Results materialize over a longer term. Residue fuel hazard is manageable but requires follow-up program of fuels reduction.
Seed-tree harvested	Sites that were subject to shelterwood or seed-tree silvicultural prescriptions over the previous 30 years resulting in old-growth legacy trees imbedded in a patchwork of shrub/sapling and pole stands.	Accelerate ingrowth in pole and shrub/sapling stands among the residual old-growth stands to reduce edge effects and maximize habitat values.	Variability in original stand treatment requires highly variable restoration prescriptions. This type will develop old-growth forest characteristics most quickly. Accessibility and residue fuel hazard depends on whether shrub-sapling or pole stages are being treated; see shrub-sapling harvested and pole harvested above.
Early mature harvested (generally no restoration actions will be taken)	Sites of clearcuts or other prescriptions that are 40–60 years of age and that have had no density management. Stands are variably stocked but often overstocked with many stems exceeding 16 inches diameter.	Allow natural succession and interstand competition to determine eventual stand characteristics.	Effects of density management are marginal as stand characteristics have already been established. Logistics, ground disturbance, and needed infrastructure are prohibitive in Reserve setting. Thinning residue from density management is of commercial size and results in major long-term fuel hazard if material is not removed from site.

Table 4-4. Extent and Factors Determining Priority of Areas for Forest Restoration

Priority ^a	Area (acres)	Seral Stage ^b	Acreage ^c	Percent of Area ^c	Current Old- Growth Habitat Values in Area	Expediency ^d	Effectiveness of Treatment ^e
1	Upper Little South Fork Elk River (1,500)	Disturbed	12–15	0.8–1.0	Very high	High	High
		Shrub-sapling harvested	11	0.7			
2	Salmon Creek (3,000)	Disturbed	181–201	6.0–6.7	High	Medium	Very high
		Seed-tree harvested	223	8			
		Pole harvested	1,275	43			
		Shrub-sapling harvested	201	15			
3	Upper South Fork Elk River (Elkhead Springs) (1,300)	Disturbed	77–89	5.9–6.8	High	Very high	High
		Seed-tree harvested	210	16			
		Early-mature harvested	217	17			
		Pole harvested	186	14			
		Shrub-sapling harvested	372	29			
4	Lower Little South Fork Elk River (1,200)	Disturbed	71–79	10.1–11.3	Absent	Low	Medium
		Early-mature harvested	259	24			
		Mature harvested	663	57			
		Pole harvested	142	12			
		Shrub-sapling harvested	50	4			
None	South Fork Elk River Corridors (400)	Early-mature harvested	260	52	Absent	Low	Low
		Mature harvested	145	29			
		Pole harvested	74	15			
		Shrub-sapling harvested	13	3			

^a Priority of areas for implementation based on percentage of shrub-sapling harvested, pole harvested, and old-growth harvested acreage, existing old-growth values, and expediency and effectiveness ratings. Highest priority areas have more than 50% of the area in these stand types and contain or are adjacent to stands exhibiting high-wildlife/old-growth habitat values.

^b Seral stages suitable for density management are noted in bold and include “Disturbed” (i.e., roads and landings to be decommissioned), “Shrub-sapling harvested,” “Pole harvested”, and “Seed-tree harvested”, as defined in Vegetation Classification and Mapping of the Headwaters Forest Reserve (Jimerson and Jones 2000). Shrub harvested areas generally have trees in the seedling and sapling age classes.

^c Range from Alternative 2B - Low Intensity Forest Restoration to Alternative 2A - Medium Intensity Forest Restoration.

^d Relative ease or efficiency in fully implementing stand density manipulation.

^e Relative effectiveness of manipulations in increasing old-growth habitat values.

how rapidly sites in various priority areas are treated or if lower intensity treatments are necessary.

Forest Restoration Intensities

Two treatment intensities of Priority 1–4 areas are feasible:

- **Moderate Intensity Forest Restoration.** Density management would be conducted in both pole and shrub-sapling stands and openings. Two to three entries in shrub-sapling stands and in revegetated watershed-restoration sites would be made as needed, and a single entry would be made in pole stands considered appropriate for such action.
- **Low Intensity Forest Restoration.** Density management would be conducted only in sapling/shrub stands and openings and in revegetated watershed-restoration sites, limited to one entry.

The choice of the preferred intensity for forest restoration in the Reserve, if adequate funding is available, is addressed in chapter 5, “Management Alternatives.”

Focus of density management will be on Douglas-fir. Redwoods, including stump sprouts, usually will not require treatment to restore a natural mix of Douglas-fir and redwood species.

Density-management treatments will not yield commercial forest products; all biomass will be left on-site and may be lopped and scattered, piled and burned, or chipped. Chain saws, mechanical brush cutters, and chippers may be used. Permanent or temporary roads or skid trails will not be developed for access to treatment sites, but temporary access routes may be developed where they will subsequently be removed during watershed restoration activities. Herbicides will not be used.

Control of Invasive Nonnative Species

Invasive, nonnative species will be controlled using manual or natural means. Watershed restoration followed by forest restoration will generally create sufficient shade to suppress invasive species that require exposure to full sunlight to thrive. Where openings in the forest canopy will remain (e.g., along trails), invasive, nonnative species will be controlled, and eliminated if possible, by cutting with hand tools. Herbicides will not be used. Monitoring the presence of invasive nonnative species will focus on trail corridors, especially heavily used trails and areas adjacent to trailheads.

Implementation Guidelines

The following guidelines are prescriptive details for forest restoration.

- Vegetation species composition, individual tree densities, and canopy closures will be managed in some or all of the stands comprising two or three of the five identified seral stages characterizing the Reserve: shrub-sapling harvested, pole harvested, and seed-tree harvested. Pole harvested stands may or may not be treated, depending on the selected forest-restoration alternative.

- In a medium-intensity program, shrub-sapling harvested and seed-tree harvested stands, as well as revegetated watershed restoration sites, would be entered up to three times over a 20-to-30-year time period. In a low-intensity program, only one entry would be made. Typically, single entry into the pole stands would be made in a medium-intensity program.
- Stem diameters of material removed in pole stands will be up to 14 inches, and stem diameters in the other stands will be up to six inches. Estimates of the number of trees to be cut or retained and slash weights for these program levels are given in tables 4-5 and 4-6.
- All material will be cut using chain saws. Slash will be treated by machine chipping, lopping to 48-inch maximum lengths, or, where the previous two methods will create hazardous conditions, by hand piling and burning. The method of slash disposal will be based on amount and size of material removed from the stand, the characteristics of the residual stand, topographic/aspect conditions of the site relative to spread of fire, and equipment access.
- In pole stands, up to 10 stems per acre having the larger diameters (10–14 inches) may be left on the forest floor uncut as moderate woody debris (MWD) if all branches are removed and the stem lies in continuous contact with the soil surface.
- Trees will be thinned using variable-density approaches. The variable-thinning approach is an appropriate method for augmenting the natural processes that result in old-growth characteristics (as described in chapter 6, “Environmental Consequences (Environmental Effects and Alternative Comparisons)”) and will be used where appropriate. With this approach, the rate of thinning will be varied throughout the stand, based on topographic/aspect conditions. The number of retained (dominant) trees for the various stand types and entries is shown in tables 4-5 and 4-6.
- Selection of the dominant trees and of the larger poles for MWD recruitment will be a result of field evaluation of individual tree characteristics suitable for dominance and the need to remove surrounding vegetation to accelerate dominance.
- No tree thinning will be conducted in stream management zones as specified in the “Aquatic Conservation Strategy” of the Northwest Forest Plan. However, where competition for sunlight is evident, poles bordering these zones will be removed with the intent of increasing sunlight to riparian vegetation communities or of improving long-term LWD recruitment.

Research Management

Management Goals

The authorizing legislation for the Reserve requires that this plan address “scientific research on forests, fish, wildlife, and other such activities that will be fostered and permitted on the Headwaters Forest.” The desired outcome of management of research is a balance between the gathering of important scientific data, needed to understand and protect ecological integrity of the Reserve, and protecting that integrity from the intrusion of the monitoring process. BLM and DFG welcome consideration of the Reserve for research/monitoring proposals.

The management goal for achieving this outcome was given in the authorizing legislation for creation of the Reserve—“to conserve and study the land, fish, and wildlife, and forests occurring on such land while providing public recreation opportunities and [meeting] other management needs.”

Table 4-5. Estimated Prescription Data for Alternative 2A: Medium Intensity Forest Restoration

Seral Stage	Acres Treatable	Size Classes Present (inches)	Approx. Number of Trees per Acre	Approx. Spacing (feet)	First Entry (@ T ₀) ^a			Second Entry (@ T ₀₊₁₀) ^a			Second Entry (@ T ₀₊₂₀) ^a		
					Residual Trees per Acre	Residual Spacing (feet)	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Tons taken per Acre
Shrub-sapling harvested	647	Seedling (<1)	500–3,000	9.3–3.8	250–300	13.2–12.0	40–80	150–200	17.0–14.8	24	50–75	29.5–24.1	56
		Sapling (1–6)											
Pole harvested	1,677	Pole (6–14)	1,600–2,000	5.2–4.7	150–200	17.0–14.8	192–256						
Seed-Tree Harvested	433	Seedling (<1)	1,200–1,600	6.0–5.2	250–300	13.2–12.0	35–65	150–200	17.0–14.8	16	50–75	29.5–24.1	8
		Sapling (1–6)											
		Pole (6–14)											
Old-growth (target stand conditions)	--	Seedling (<1)	1,000	6.6									
		Sapling (1–6)	300	12.0									
		Pole (6–14)	100	20.9									
		Mature (14–50)	50	29.5									
		Old-growth (>50 and >200 years)	10–30	38.1–29.5									

Assumptions:

Seedlings: negligible weight.

Saplings: average weight = 80 pounds.

Pole: average weight = 320 pounds.

^a T_{subscript} refers to years from initiation of management.

Table 4-6. Estimated Prescription Data for Alternative 2B: Low Intensity Forest Restoration

Seral Stage	Acres Treatable	Size Classes Present (inches)	Approx. Number of Trees per Acre	Approx. Spacing (feet)	First Entry (@ T ₀) ^a			Second Entry (@ T ₀₊₁₀) ^a				Third Entry (@ T ₀₊₂₀) ^a			
					Residual Trees per Acre	Residual Spacing (feet)	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Trees Taken per Acre	Tons Taken per Acre	Residual Trees per Acre	Residual Spacing (feet)	Trees Taken per Acre	Tons taken per Acre
Shrub- sapling harvested	647	Seedling (<1)	2,000–3,000	4.7–3.8	200	14.8	72–112								
		Sapling (1–6)													
Pole harvested	1,677	Pole (6–14)	1,600–2,000	5.2– 4.7											
Seed-tree harvested	433	Seedling (<1)	1,200–1,600	6.0–5.2	100	9.3	55–75								
		Sapling (1– 6)													
		Pole (6–14)													
Old-growth (target stand conditions)	--	Seedling (<1)	1,000	6.6											
		Sapling (1–6)	300	12.0											
		Pole (6–14)	100	20.9											
		Mature (14 –50)	50	29.5											
		Old-growth (>50 and >200 years)	30–50	38.1– 29.5											

Assumptions:

Seedlings: negligible weight.
Saplings: average weight = 80 lbs.
Pole: average weight = 320 lbs.

^a T_{subscript} refers to years from initiation of management.

A second management goal established here is to encourage research that involves monitoring and studying the Reserve's attributes potentially affected by the management direction established by this plan and to provide baseline monitoring to measure changes/impacts from private timberland harvesting.

Management of the Reserve's resources in unimpaired condition, while providing appropriate visitor use, requires a full understanding of resource components, their interrelationships and processes, and effects of visitation, which can be obtained only by the accumulation and analysis of information produced by scientific methods. Appropriate scientific studies should be designed to increase understanding of human and ecological processes and resources and/or to seek to understand the unique values of the Reserve. The ultimate goal of research at the Reserve must be to develop scientific understanding to further the goals for which the Reserve is established.

Management Direction

Use of Permit System

A research/monitoring permit will be required for most scientific activities pertaining to natural resources or social science studies in the Reserve that involve fieldwork or specimen collection and/or have the potential to disturb resources or visitors. When permits are required for scientific activities pertaining solely to cultural resources, including archaeology, ethnography, history, cultural museum objects, cultural landscapes, and historic and prehistoric structures, other permit procedures apply. BLM may authorize staff to carry out official duties without requiring a permit. BLM staff must comply with professional standards and conditions normally associated with scientific research/monitoring permits issued by BLM.

BLM will approve or deny a research/monitoring permit based on an evaluation of favorable and unfavorable factors and on an assessment of perceived risks and benefits. Although BLM staff will work with applicants to arrive at a mutually acceptable research design, there may be activities where no acceptable mitigating measures are possible and the application may be denied.

Types of Research to be Conducted

Six types of research will be conducted at the Reserve. Research in the first five categories is of highest priority.

- **Pacific Lumber Company's Habitat Conservation Plan (HCP) Monitoring Commitments.** This HCP contains specific requirements for forest ecosystem monitoring to ensure that specific thresholds are being met or not exceeded on PALCO's timberlands or to document ecological conditions on a landscape scale. For the latter, many of these requirements involve monitoring, inventory, and research activities within the Reserve. BLM will continue to coordinate with the HCP interagency monitoring group to permit these activities as necessary on Reserve lands.
- **Marbled Murrelet Recovery Plan.** This recovery plan indicates that current population size and trend information needs to be refined through additional at-sea surveys, refined survey sampling design, and data analysis techniques. Information on marbled murrelet survivorship estimates and juvenile:adult ratios at sea also needs to be collected over a number of years (e.g., 5–10 years) to further validate the current population model. Several years are required

to account for possible natural variability and the periodic occurrence of El Niño (and other warmwater) conditions that may lead to variation in breeding success.

- **Watershed Restoration and Stabilization Program.** Sediment source inventory and monitoring is critical to maintaining aquatic ecosystem integrity in both the short and long terms. BLM will continue sediment-source monitoring and assessment to prevent or minimize catastrophic releases of sediment and to gauge the success of road decommissioning and other sediment-reduction activities throughout the Reserve (see “Watershed Restoration”).
- **Compliance with Environmental Law.** Activities within the Reserve require monitoring for compliance with all environmental laws and regulations described in chapter 2, including plan-specific mitigation monitoring under CEQA and monitoring requirements of USFWS and NMFS to ensure compliance with ESA. These laws require monitoring the effects of planning programs and implementation of mitigation measures for projects undertaken pursuant to this plan. Mitigation monitoring needs under CEQA and anticipated monitoring requirements under ESA are described in “Resource Monitoring and Evaluation” in a subsequent section of this chapter.
- **Basis for Long-Term Adaptive Management and Planning.** Highly related to but extending beyond monitoring for environmental compliance, research will be needed for assessing management of the Reserve. Management planning will be ongoing and will be based on continued ecosystem analyses and monitoring of results of plan implementation. BLM will continue to develop data about particular aspects of the Reserve that are critical to planning decisions, including
 - ❑ sediment source inventories;
 - ❑ forest stands inventories;
 - ❑ visitor data, both quantitative and qualitative;
 - ❑ improved vegetation data;
 - ❑ road and skid trail network inventories;
 - ❑ nonvascular plant inventories;
 - ❑ other floral and faunal monitoring and inventory; and
 - ❑ possibly others.

Specific monitoring needs for implementation of this plan are described in “Resource Monitoring and Evaluation” in a subsequent section of this chapter.

- **Basic Research.** In addition to the above research and monitoring, basic research into ecosystem process, structure, and function should be conducted at the Reserve. Such research need not necessarily be focused on a current management issue but may be of value to a better understanding of the functioning of old-growth ecosystems in the north coast region. This type of research would most likely be conducted by scientists affiliated with academic institutions or government research agencies.

Criteria for Approval of Research Proposals

Several factors will be considered in evaluating proposed research at the Reserve (see “Implementation Guidelines” below). The primary factor favorable for approval is a showing that the research contributes information useful to an increased understanding of the Reserve’s

resources and thereby contributes to effective management and/or interpretation of resources or addresses problems or questions of importance to science or society and shows promise of making an important contribution to such knowledge. Other important criteria must be met, however.

Implementation Guidelines

Research Proposal Evaluation Criteria

Several factors will be considered by BLM and DFG in approving research at the Reserve. Favorable and unfavorable factors, as well as specific information needs, are described in this section.

The suitability of proposed research increases when

- information is useful to an increased understanding of the Reserve's resources and thereby contributes to effective management and/or interpretation of resources;
- sharing of information is scheduled with BLM, including any manuscripts, publication, maps, and databases that the researcher is willing to share;
- problems or questions are of importance to science or society and show promise of making an important contribution to knowledge of the subject matter;
- a principal investigator and support team with a record of accomplishment in the proposed field of investigation have demonstrated ability to work cooperatively and safely and to accomplish the desired tasks within a reasonable timeframe;
- the investigators prepare occasional summaries of findings for public use, such as seminars and brochures;
- natural and cultural resources, operations, and visitors are not disrupted;
- cataloging and care of collected specimens is planned;
- detail about provisions for meeting logistical needs are provided;
- the research is supported academically and financially; and
- fieldwork, analyses, and reporting will all be completed within a reasonable time frame.

The suitability of proposed research diminishes when

- activities adversely affect the natural resources or the experiences of visitors;
- there is potential for adverse impact on natural, cultural, or scenic resources, particularly on nonrenewable resources, such as archaeological and fossil sites or special-status species;
- the research is redundant to previous research conducted in the Reserve or in other similar ecosystems (unless designed to corroborate studies in other areas);
- potential exists for creating risk of hazard to the researchers, visitors, or ecosystem integrity;
- extensive collecting of natural materials is planned or unnecessarily replicates existing voucher collections;

- substantial logistical, administrative, curatorial, or project monitoring support by BLM staff is required;
- time is insufficient to allow necessary review and consultation;
- the principal investigator lacks scientific institutional affiliation and/or recognized experience conducting scientific research; and
- scientific detail and justification are inadequate to support achieving the study objectives.

Finally, research proposals must address the following elements to receive consideration:

- power equipment or potentially hazardous materials to be used;
- numbers of staff entering the Reserve;
- duration and frequency of field visits;
- degree of staff intrusion into old-growth forest groves;
- conformance with seasonal and daily operating period closures due to marbled murrelet activity;
- conformance with wet-season operating restrictions;
- use of existing roads and trails;
- limiting of flagging, marking of survey stations, and other intrusions; and
- actions to minimize impacts on visitors, wildlife, and ecosystems (e.g., food storage, trash storage).

Research Overnight Occupancy Guidelines

Overnight camping for researchers will be minimized, but may be authorized on a restricted trial basis. The requirements below are intended to minimize the threat that corvids present to the threatened marbled murrelet, by avoiding human behaviors that are known to attract corvids and to minimize hourly and seasonally, the potential for disturbing murrelet nesting. Under no circumstances should a corvid have a successful feeding attempt as a result of authorized research and associated camping. The following is a preliminary list and will be updated as needed through the research permit process.

- No littering of any kind, including discharge of chemical or biodegradable substances.
- Researchers must carry a copy of their research permit on their persons and display a copy on the dashboard of vehicles parked at Reserve trailheads.
- Camping is prohibited within 0.25 mile of the old-growth groves and within 150 feet of surface water. Former log landings should be used for camping whenever possible.
- Research communication radio speakers must be no louder than a normal human voice in quiet conversation.
- Radios, CD/tape players, boom boxes, howling, and hooting are prohibited. Voices should be no louder than a normal human voice in quiet conversation.
- Tents will be dismantled by eight a.m. and will not be left standing during the day. Campsites will be dismantled, packed, and stowed under shrubbery to reduce line of sight from the air as well as from visitors.

- Avoid or minimize disturbance to vegetation, downed logs with cryptogamic communities, and other natural elements of the forest floor.
- No open campfires are allowed. Gas stoves and lanterns are allowed, contingent on current fire restrictions.
- Should researcher encounter corvids during their stay, they should note the location of the encounter, the number of birds observed, and whether corvid feeding on food wastes was attempted or successful and notify the Arcata Field Office of the BLM.

Research Permit Procedure Guidelines

The following guidelines will apply to all permit applications for research/monitoring.

- **Permit Authorization.** BLM will authorize research and monitoring proposals under 43 CFR 2920, "Leases, Permits, and Easements through issuance of a Special Use Permit."
- **Qualified Applicants.** Any individual may apply if he/she has qualifications and experience to conduct scientific studies or represents a reputable scientific or educational institution or a federal, tribal, or state agency.
- **Processing Time Requirements.** It is recommended that application for permits be received by BLM at least 180 days in advance of first planned field activities. Projects requiring access to restricted locations or during critical nesting seasons or projects proposing activities with sensitive resources, such as threatened and endangered species or cultural sites, usually require extensive review and can require 90 days or longer to complete any needed consultations with NMFS and/or USFWS.
- **Additional Required Approvals.** In some cases, other federal or state agency permits or approvals may be required before BLM can approve an application for a research/monitoring permit. The principal investigator is required to provide BLM with copies of such permits with its application. (Applicants are encouraged to contact BLM staff to determine if additional permits may be required in conjunction with a proposed study.)
- **Location of Application.** Application materials may be obtained from the BLM Arcata Field Office at 1695 Heindon Road, Arcata, California 95521 (Phone: (707) 825-2300). All application materials must be submitted to this office.
- **Research Proposal.** Applications for research/monitoring permits must include a research proposal. Proposals must include, as appropriate, all elements outlined in the separate document *Guidelines to Researchers for Study Proposals*.
- **Proposal Review.** Each proposal will be reviewed for compliance with NEPA, the endangered species acts, and requirements of other laws, regulations, and policies. The Arcata Field Manager may also require internal and/or external scientific review, depending on the complexity and sensitivity of the work being proposed and other factors, such as the availability of staff expertise for adequate evaluation. The applicant may expedite review of a proposal by providing existing peer reviews or by providing names and addresses of appropriate persons recommended to assist in review of the proposal.
- **Timing of Review.** The time required to review the permit application and accompanying study proposal will be proportional to the type and magnitude of the proposed research/monitoring. A single visit to the Reserve for a nonmanipulative research project will require a relatively simple proposal, and the permitting decision will be expedited. A highly manipulative or intrusive investigation having the potential to affect nonrenewable, rare, or

delicate resources or needing detailed planning or logistics will require more extensive and longer review.

- **BLM Response.** The principal investigator will receive notice of the approval or rejection of the application by written correspondence via mail, electronic mail, or facsimile. If modifications or changes in a study proposal initially deemed unacceptable would make the proposal acceptable, BLM will suggest them at this time. If the application is rejected, the applicant may consult with BLM staff, clarify issues, suggest modifications, and make an amended application if appropriate.
- **Performance Procedures.** If the proposal is approved, the applicant will receive a copy of a Special Use Permit, which must be signed and returned. The permit will then be validated and an approved copy returned to the applicant, at which time activities within the Reserve may begin. A list of names of all persons involved in field research must be provided to BLM. The lead field researcher must meet with assigned BLM staff at the Arcata Field Office immediately prior to the first field visit. A copy of the permit must be carried at all times by all field staff while performing authorized activities at the Reserve. The permit must also be displayed prominently on all vehicles accessing the site.

Fire Management

Management Goals

The desired outcome of management of the Reserve is a dominance of old-growth redwood and Douglas-fir forests on uplands, interspersed by mature riparian vegetation along all of the watercourses. Some patches of earlier successional seral stages would be present, as a result of disease, windthrow, and infrequent fire. The fire regime would replicate the natural fire regime prior to the era of fire suppression and timber entry, to the degree that it is consistent with the need to protect resources of adjoining properties and the need to protect the Reserve from unnatural catastrophic fire originating on surrounding lands managed for timber production. The fire frequency would be on the order of 100 to several hundred years.

The following goals to achieve this desired outcome are established:

- Restoration of shrub-dominated sites and earlier-successional forest to old-growth forest.
- Protection of old-growth forests from catastrophic fires originating in second-growth forests either outside or inside the Reserve.
- Reduced effects of catastrophic fire on all forests and soils of the Reserve.
- Prevention of the movement of wildfire into or out of the Reserve.

Management Direction

Fuels Treatment

Fuels in second-growth forest will be reduced through tree-density reduction and brush removal in sapling and pole stands, as described in the “Forest Restoration” section above. Thinned stands will be less susceptible to spread of fire. Foliage and smaller stems from removed trees and brush will be lopped and scattered, piled and burned, or chipped. The high rate of biomass

decomposition due to wet and warm maritime conditions at the Reserve will rapidly reduce flammability of lopped and scattered fuels. Broadcast burning is not proposed at the Reserve and will not be employed. Establishment of a shaded-fuelbreak network is not needed and is not appropriate, because the entire second-growth stand area will be treated to acquire the character of a shaded fuelbreak as it recovers old-growth characteristics.

Fuel loading in second-growth stands will be managed in a manner that reduces fuel loading and continuity throughout and therefore reduces fire risk. Fuels will not be managed in old-growth forest and generally not in second-growth forest once it achieves early-mature seral stage.

Fire Suppression

A universal mode of fire suppression (e.g., full suppression) will not be employed throughout the Reserve. Factors to be considered for any incident will be fuel loads and stand flammability, fuel and atmospheric humidity, wind direction and predictability, fire location with respect to topography and roads, risk of severe damage to old-growth forests, risk of fire escape to adjoining ownerships, and other site-specific factors. All fires will be managed to minimize loss of unharvested forest stands and impacts of fire suppression activities in old-growth.

In all areas of the Reserve, suppression response would entail a *minimum-impact strategy*, but it would recognize California Department of Forestry and Fire Protection's (CDF's) mandate to *contain* wildland fire. Suppression response would vary between fire in old-growth stands and fire in second-growth stands, as described below. Second-growth stands are the most susceptible to fire spread and have the highest capability for carrying fire into old-growth stands on the Reserve or into adjacent timber lands. Conversely, the risk of the development of a catastrophic fire is much less for fire originating within old-growth stands than in second-growth stands. Fire in second growth stands would nearly always be met with an immediate response to extinguish it fully by either direct or indirect means, as appropriate to the situation. Instances of monitoring fire in second-growth stands without immediate suppression would be rare. The latter approach may be considered in some instances where extensive fuels treatment has occurred, and topographic and weather conditions are highly favorable.

Implementation Guidelines

Initial attack on fires within the Reserve may be made by BLM or CDF personnel. Responsibility for suppression will lie with CDF, and fire suppression will be carried out consistent with the following guidelines wherever and whenever unacceptable risks to life and property are not created. Details of fire suppression operations will be outlined through a specific operational plan developed jointly with CDF.

Fire Suppression Strategies in Second-Growth Forest

The ridgetop road system along the southern boundary of the Reserve will be maintained by PALCO and will be the primary ridgeline road for intercepting advancing fire from either inside or outside of the Reserve. PALCO roads will also remain open to Elkhead Springs and around the vicinity of the Reserve.

Suppression strategy will reflect site-specific fuels condition and forest-restoration condition. Containment will be accomplished by using dozer lines, hand lines, or wet lines as appropriate and consistent with the minimum impact strategy. Fire lines will be tied into existing roads to the fullest extent possible. Watershed boundaries will be fully utilized, particularly around the southern boundary. During the period of recovery of second-growth forest to old-growth forest, several existing ridgetop fuelbreaks (old skid roads) within the Reserve will remain available and accessible from the south boundary.

If necessary, dozers can be used for fire suppression, but their use will be confined to ridgetops to the extent possible. Natural barriers should guide configuration of fire lines where feasible. Resource damage from dozers will be minimized, and full rehabilitation of dozer fire lines will be required after fire suppression.

Chemical retardants and foam suppressants may be used in the Reserve in second-growth stands according to appropriate guidelines to protect watercourses.

Fire-Suppression Strategies in Old-Growth Forest

Access to old-growth forest will be available from existing road systems at Salmon Pass, Alicia Pass, and the entire length of the N09 road through the southern end of the Reserve. Helispots should be developed in recent clearcuts at the north end of main old-growth grove to hasten access. Helispot development would also speed access into second-growth areas in the Little South Fork Elk River watershed.

The suppression strategy will be to monitor all fire starts and develop an appropriate management response that varies whether the fire burns on the forest floor or in the forest canopy. Fires may be allowed to burn if weather, fuel, and topographic factors are favorable. If not, hand crews or helicopter bucket drops will be deployed to attempt to contain ground fire. For snag or individual tree fires, helicopter bucket drops will be used. A subsequent operational plan with CDF will identify specific helispot locations and water sources.

Dozers, chemical retardants, and foam suppressants will not be used in old-growth stands.

Visual Resource Management

BLM's Visual Resource Management (VRM) program establishes a method for determining the inherent visual qualities of the landscape and the impacts of human activities on these qualities. The program also includes methods for rating the effectiveness of rehabilitation projects and minimizing visual impacts from new projects. Appendix E describes the VRM program and VRM zones for the Reserve.

Recreation Access Management

Recreation activities in the Reserve must be consistent with the primary purpose for which the Reserve was created—preservation and restoration of old-growth forest ecosystems and related values. Accordingly, recreation on the Reserve will focus on providing recreation experiences related to old-growth and riparian ecosystems, forest and watershed restoration, and sociocultural

and historical use of the Reserve. Management of the Reserve will focus on providing these experiences and not on duplicating the extensive multiple recreation activities and facilities already available at nearby state parks and other public recreation areas. The premier recreation attribute of the Reserve's old-growth forest is that it is not bisected by extensive trails and other forms of development and human use. This management focus will allow for recreation programs and uses that are unique in the Redwood Region, while meeting the mandate to give primary emphasis to ecosystem protection. Visitors accessing the proposed trails will know that they are seeing a place where nature is protected in its most pristine form. Other types of recreation activities, such as those with a sporting or competitive emphasis, are already well served by parks and other public lands in the region (see chapter 3 for a description).

Management Goals

The desired outcome of management of public access to the Reserve is a careful balance between maintaining ecosystem integrity and providing opportunities for public environmental education and contemplation of the earth's ancient forest heritage (see appendix F, "Visitor Management Zones"). To achieve this desired condition, the following goals for management of recreation access are established:

- Continue opportunities for year-round, outstanding environmental interpretation and education at the Reserve.
- Provide the minimal necessary facilities needed to support the recreation program.
- Enable frequent contact between visitors and managers to promote environmental education and maintenance of ecosystem integrity.
- Offer a continuing program of outreach to local and regional schools and environmental organizations to foster environmental education and support for Reserve restoration and maintenance activities.
- Minimize disturbance to adjoining residents and landowners caused by visitors to the Reserve.
- Offer interpretation of appropriate historic properties.
- Increase opportunities for visitors' sociocultural and educational experiences.
- Provide a trail network and use strategy with an appropriate level of access to the Reserve's resources.

Management Direction

Access to the Reserve

Public road access to the northwestern end of the Reserve will continue to be provided year-round by the Elk River Road, which is regulated and maintained by Humboldt County.

Under some alternatives (see chapter 5, "Management Alternatives"), access to the southern portions of the Reserve would continue to be provided seasonally by the County's Newburg Road and PALCO's Felt Spring Road. This route will continue to be closed during the rainy season. Use of the southern access may continue to be limited to guided access or may be made available to unescorted individual vehicles during appropriate periods, depending upon the alternative

selected (chapter 5). A visitor center may be developed in Fortuna to facilitate use of the southern access if need, interest, and funding are available.

General Access Provisions

By law, recreation activities in the Reserve must be supportable with minimal facilities and conducted so as to preserve ecological integrity of the Reserve's ecosystems. Parking and trailhead facilities will be developed consistent with the trail extent and trail use alternatives selected (chapter 5). Permanent restroom facilities will be developed at the Elk River Trailhead and at Salmon Pass.

All visitor access will be provided on designated trails. Possession of firearms will not be allowed. In the Elk River Corridor, trail spurs would be constructed to the river, to cultural interpretive sites, and to developed picnic sites (figure 4-2). Dogs would be allowed in the Reserve on leash or within voice control, consistent with existing county ordinance, and only on the Elk River Corridor Trail. Depending upon levels of use, dog owners may be required to pick up and dispose of dog waste. Throughout the Reserve, visitors will be encouraged and required to contain food items in designated picnic sites and to pack out food scraps and other waste. BLM rangers will be present in the Reserve as necessary to ensure compliance with rules and regulations and to serve as recreation resources to the interested public.

Regardless of the trail-extent and trail-use alternatives selected, all activities within the Reserve will be subject to general management direction of BLM's various visitor management zones and visual resource management classes. These zones and management guidelines are described in appendices E and F. Three visitor management zones will be recognized:








- Zone 1, unharvested forests, will be managed to be essentially free of visitors and human-made features.
- Zone 2, harvested forests, will be managed for predominantly natural or natural-appearing environments with relatively light visitor use.
- Zone 3, Elk River Corridor, will be managed as a natural-appearing environment with considerable visitor use.

Recreation Program

The Reserve will be available to individuals and organizations for nature study and photography, interpretive walks, school and community outreach programs, and special thematic events related to the unique forest resources of the Reserve. BLM will organize or sponsor many of these activities on a regular basis, either on its own initiative or in response to requests from interested organizations. Activities will include opportunities for docent-led exploration. The purpose of these activities will be to impart environmental knowledge, foster respect for ecological systems, and nurture support for restoration and preservation of the Reserve's unique ecological resources. To facilitate participation in such activities, an open-air pavilion for recreation events would be constructed a short distance beyond the Elk River Trailhead. Interpretive kiosks would be installed at trailheads, and two short trails to historical resources would be constructed in the Elk River Corridor. The range of planned activities is described under "Implementation Guidelines" below.

Figure 4-2
Interpretive Facilities Proposed
for the Elk River Corridor

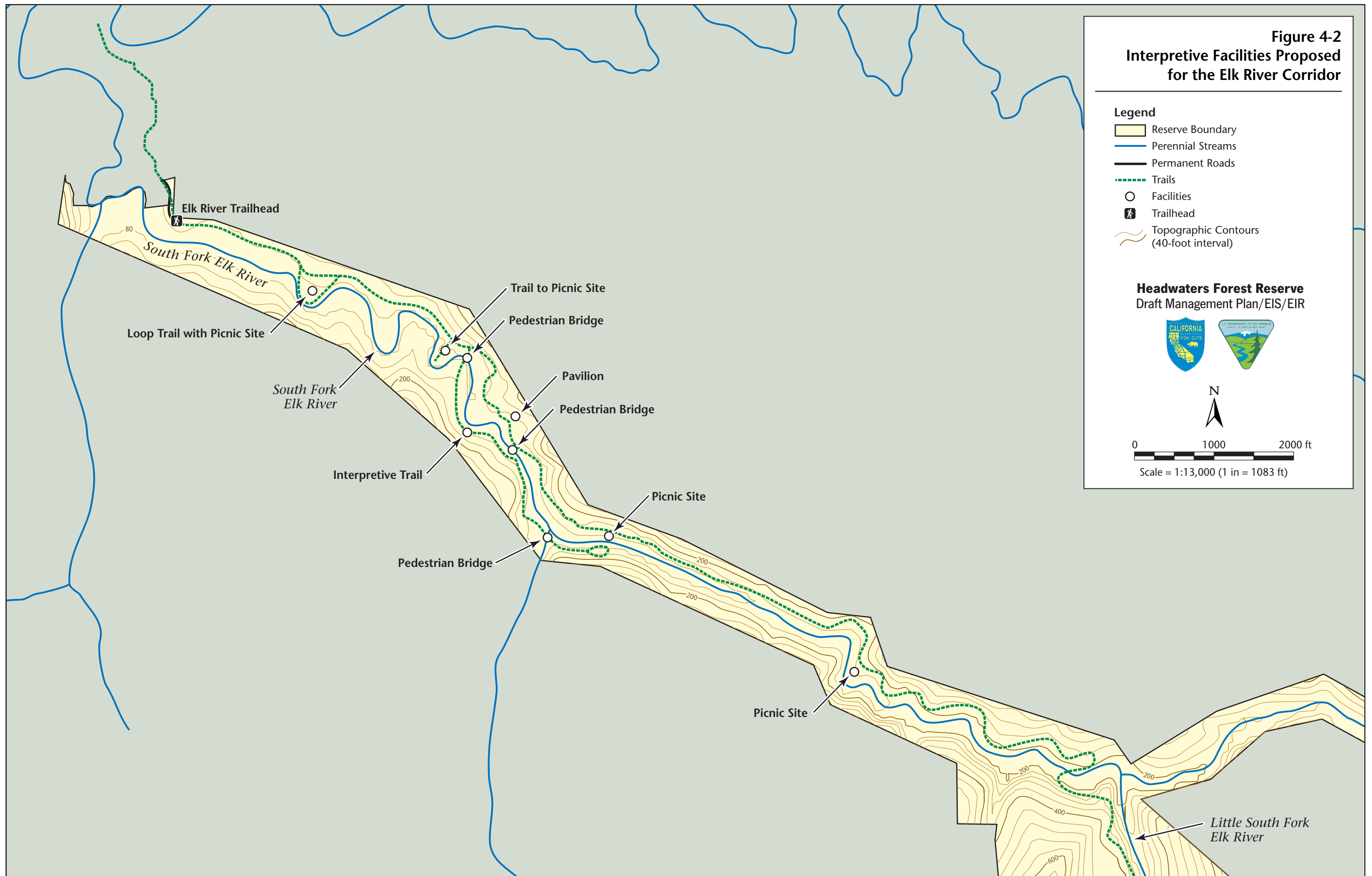
Legend

-  Reserve Boundary
-  Perennial Streams
-  Permanent Roads
-  Trails
-  Facilities
-  Trailhead
-  Topographic Contours (40-foot interval)

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



Scale = 1:13,000 (1 in = 1083 ft)



Trail System and Uses

Reserve access will be facilitated by an interpretive trail system to allow visitors to experience old-growth ecosystems and riparian ecosystems along the Elk River and Salmon Creek. Alternatives for the extent of such access (chapter 5) are formulated on the basis of the degree of visitor contact with old-growth ecosystems that would be accommodated, and therefore on the basis of the degree of preservation of old-growth and aquatic ecosystems that would be provided. In addition to the three trails now available for use, eight trails are presented in chapter 5 and analyzed in this document.

To facilitate interpretive experiences and environmental education, the primary mode of use of the trail system will be for walking and hiking. In chapter 5 ("Management Alternatives"), alternatives for use by equestrians and bicyclists are presented. Use of some or all of the trails will be restricted on seasonal and hourly bases to protect nesting of marbled murrelet and northern spotted owl and to protect trails or access roads from erosion and impacts of use during wet conditions.

To contain the spread of food items, which could attract scavenger species in the Reserve, picnic sites will be limited to the Elk River corridor as noted above, with an additional site situated along the New Little South Fork Elk River Trail (if that trail is constructed; see chapter 5, "Management Alternatives").

Extension of the Elk River Corridor Trail beyond the confluence of the South Fork and Little South Forks of the Elk River was initially considered for some alternatives but was eliminated because the narrowness of the public land corridor would serve as an inducement for trespass on privately owned industrial timberlands (see appendix J, "Alternatives Considered but Eliminated").

Use of bicycles on steeper, narrow trails was initially considered for some alternatives but was eliminated because of trail safety, sedimentation, maintenance, and wildlife concerns (appendix J). Bicycle use also conflicts with the management intent of the Reserve for contemplative, interpretive-oriented recreation. Equestrian access from the southern access was initially considered for some alternatives but was eliminated because of absence of a suitable location for a parking area large enough that it could serve for horse loading and unloading (appendix J).

Implementation Guidelines

Guidelines are given below for the range and content of the recreation program, trail construction and maintenance, and control of spread of nonnative plants into the Reserve by equestrians.

Recreation Program

Themes

The Reserve will include the following interpretive themes:

- **Value.** The unique value of the Headwaters Forest results from its diversity and rare type of habitat.

- **Dwelling place.** The Headwaters Forest is a home. In the past it was a home to Native Americans, followed by residents of Falk. Today it is critical habitat for many important plants and animals.
- **Preservation.** The Reserve was established by the efforts of many people from various levels of government and segments of the public.
- **Stewardship.** The Reserve is part of our public heritage; individuals can each make a positive contribution to the health of the Reserve so it will be enjoyed for generations to come.

Interpretive Facilities

Several facilities will be constructed at the Reserve to support the interpretive program:

- **Outdoor Interpretive Kiosk.** Providing orientation information and an introduction to prominent natural and cultural features in the Reserve. Material will focus on actions that reduce visitor impact.
- **Pavilion.** Situated in view of evident historical landmarks and natural features of a changing habitat, this sheltered arena will serve as a meeting area for recreation discussion and activities. It will be used for specialized thematic events, school groups, and organized walking groups.
- **Interpretive Trails**
 - *Self-guided Trail.* Guided by a pamphlet, visitors will experience marked points of unique historical interest, with information intended to promote a multicultural interest in and respect for the resources of the area.
 - *Trail to Train Barn.* Guided by infrequent signs at key points along the trail, visitors will be encouraged to act responsibly in relation to remnant artifacts and natural resources.
 - *Bungalow Trail.* Guided by infrequent signs at key points along the trail, visitors will be encouraged to act responsibly in relation to natural resources.

School-Focused Educational Programs

- *Preliminary school outreach programs*—programs in local schools to promote interest in preservation of the Reserve, using photographic slides or electronic presentations, to focus on historical and natural resources.
- *Headwaters-Falk historical curriculum*—a grades 4–12 curriculum focused on the townsite of Falk. (The program has already been developed and distributed to local schools, and distribution will continue.)
- *Headwaters Forest natural science curriculum*—a grades K–6 curriculum for local schools that focuses on the interpretive themes and unique natural and historical resources of the Reserve.
- *School site programs*—continued involvement with schools that participate in the preliminary school outreach program. Sessions may be preparatory to field trips.
- *Reserve field trips*—field programs presented to local school groups at the Reserve. Programs would involve hands-on, interactive approaches focused on the natural and cultural

values of the Reserve designed to encourage stewardship of public lands by the younger generation.

Interpretive Programs

- *Guided interpretive walks*—guided interpretive walks that focus on the interpretive themes as expressed by the interesting natural and cultural features of the Reserve. Walks would be scheduled in the nonrainy season.
- *Community outreach programs*—a series of programs that focus on specific resource issues and historical events of relevance to the broad community.
- *Specialized thematic events*—events that take place at a centralized meeting area where a variety of walks, talks, displays, and activities will be made available. Programs will focus on a specific unique feature of the Reserve.

Trail Construction and Maintenance Guidelines

The following guidelines will be employed in the development of new trail elements, conversion of roads to trails, and maintenance of trails:

- Buffer all recreation access, restoration activities, trail construction or maintenance activities, or other work requiring use of motorized equipment from marbled murrelet and northern spotted owl nesting habitat during the period of February 1–September 15. Use vegetative screening or topographic screening, establish seasonal operating periods, or create a distance buffer of up to 0.25 mile, as determined in consultation with USFWS.
- Minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
- Avoid sidecasting to prevent the introduction of sediment into streams.
- Minimize sediment delivery to streams from trails. Outsloping of the tread surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route drainage away from potentially unstable channels, fills, and hill slopes.
- Provide and maintain fish passage at all crossings of existing and potential fish-bearing streams.
- Replace culverts and bridges only during times of low streamflow but prior to upstream migration of adult anadromous salmonids. Replacement activities should avoid, to the extent feasible, removal of any riparian vegetation.
- Use materials for bridge repair, replacement, or temporary crossings that minimize the possibility of introduction of fine sediments or toxins into the drainage system.
- Minimize disturbance to riparian reserves for bridge and stream-crossing replacement. Disturbed ground should receive appropriate erosion control treatment (mulching, seeding, planting, etc.) prior to the beginning of the wet season.
- Maintain foot trails to gradients not to exceed 10%. Pitch grades up to 15% may be used to a maximum of 100 feet, provided erosion can be prevented.
- Develop new trail treads that are 18–48 inches wide.

- Limit culvert use to locations where no other methods are feasible (e.g., grade dips, water bars).
- Keep switchbacks to a minimum wherever possible. Design switchbacks with curve radii as long as possible, with an absolute minimum of six feet for pedestrian use.
- Use native soil to construct new trails to the extent possible.
- Consult and follow the additional trail design specifications described in BLM Handbook 9114-1.

Guidelines for Preventing the Spread of Noxious Weeds and Pathogens by Equestrians

The following guidelines for preventing the spread of noxious weeds and pathogens through any equestrian activity at the Reserve have been synthesized from the California BLM's Weed Prevention and Management Guidelines, Nevada BLM's weed prevention web site, recommendations from the University of Colorado and University of California Extension services, recommendations from the Arizona Department of Agriculture, and recommendations of University of California, Davis, faculty of the School of Veterinary Medicine.

- Post interpretive/regulatory signs at equestrian parking areas that state the following guidelines and explain that the Reserve is to be managed to maintain ecological integrity for native species and that with public cooperation the risk of nonnative species and pathogen introductions can be minimized.
- Avoid moving horses from weedy areas to weed-free areas (i.e., Headwaters) when weeds are producing viable seeds. This is a seasonal guideline; in some periods of the year, grazing on noxious weeds will not result in any viable reproductive plant parts being ingested or passed in feces.
- If horses have been grazing in a weedy area that is flowering and going to seed, place animals in a holding area for a minimum of 48 hours (96 hours is recommended), and feed them hay or pellets known to be free of weeds. This method would eliminate all existing viable seeds from the animal, and any feces dropped on public lands will not contain any nonnative, invasive weed parts capable of propagation.
- Ensure that hay and bedding in horse trailers are weed-free. If there is any question about possible weed seed content, contact the agricultural extension office in the area where the hay or bedding was produced.
- Deworm horses regularly, particularly a few days prior to visiting the Reserve.
- Develop trail watering sources that are isolated from the Reserve's streams and drainages and do not overflow and create runoff.
- Prevent horses from entering streams and streambank areas.
- Meet with local equestrian groups and provide them with information on preventing weed spread.
- Post guidelines on the Internet and make available for distribution via mail.

Cultural Resource Management

Management Goals

The desired outcomes of cultural-resource management are to preserve significant cultural resources, acquire information about past human activities that can be extracted from these resources, and communicate this information to researchers and the public. Thus, three goals are established:

- Permanently protect all significant cultural resources from natural or human-caused disturbance or destruction.
- Extract all information about past human activities that the resources may hold.
- Offer ongoing interpretation of acquired information for the public.

Management Direction

Determine NRHP Eligibility of Reserve's Properties

The primary management direction in the near term is to prepare NRHP nominations for all eligible historic properties within the Reserve and obtain a determination of which sites are suitable for listing. Three cultural properties within the Reserve are potentially eligible and will be nominated to the NRHP as follows:

- the "Old Military Trail";
- the ridgetop prehistoric site; and
- a historic district that includes the townsite of Falk, the Elk River Mill and Lumber Company millsite, the Bucksport and Elk River Railroad, Maggie's Camp, Creek House, and the End-of-the-Line site, all related to the early logging era.

The Old Military Trail is potentially eligible under NRHP criterion (a) for its association with the Indian Wars of Northwest California in the 1850s. The ridgetop prehistoric site is potentially eligible under criterion (d) for its potential to yield information important in prehistory. The thematic historic district is potentially eligible under criteria (a), (c), and (d). Because of its disturbed condition, the townsite of Scribner is recommended as ineligible for the NRHP.

A research plan leading to formal NRHP nominations for these sites will be developed and implemented. Until formal NRHP eligibility determinations are made in consultation with SHPO, each of the known sites will be managed as if it were a significant cultural resource. If sites are found suitable for listing, management plans will be prepared for each, addressing preservation actions, including management of site visitation.

Protection

BLM will enforce laws against illegal resource use by patrolling all potential NRHP sites and the locations around them where public access is likely. Administrative and physical measures to protect all historic properties within the Reserve will include monitoring of resource condition,

surveillance by law enforcement personnel in potential problem areas, posting signs to inform the public of the consequences of removing or disturbing cultural resources, fencing of resources, public education, and involvement of interested parties in conformance with the Archaeological Resources Protection Act. To minimize the potential for site disturbance, cultural resource staff will help define areas unsuited to particular recreation uses, such as picnicking and trail alignment.

Information Acquisition

BLM will consult further with affected Native American tribes and schedule tours of the Reserve for their elders and youth to gather more information about traditional use areas and activities.

The process of nominating sites to the NRHP will involve acquiring further information about the potentially significant sites. An archaeological testing program will be implemented at the ridgetop prehistoric site to collect surface artifacts and analyze the site's NRHP eligibility and research potential. Resources will be collected at some of the locations around the townsites of Falk, the Elk River Mill and Lumber Company, and Maggie's Camp to assure their preservation.

Interpretation and Native American Use

A recreation program (described in "Recreation Access Management" above) will be developed around the Reserve's significant cultural properties. The program will include trailhead information signs, interpretive spur trails in the Elk River corridor, guided interpretive walks, in-school and in-Reserve educational sessions, and public events organized around historic and/or prehistoric themes.

Native American requests to practice traditional activities or participate in interpretive activities within the Reserve will be welcomed and will be approved on a case-by-case basis, consistent with the overriding purpose of Reserve management—preservation of ecosystem integrity—and other management direction in this chapter.

Implementation Guidelines

All cultural resources known or expected to occur on public land within the Reserve will be managed for their information, public, or conservation values as per BLM Manual 1623, the Federal Land Policy and Management Act, and the National Historic Preservation Act. Guidelines for managing cultural resources are found in the revised BLM 8100-series cultural resource management manual sections (up to 2001) and under the National (1997) and California State (1998) Programmatic Agreements between the Office of Historic Preservation and BLM.

If any cultural materials or sites are encountered during ground-disturbing activities within the Reserve (e.g., pavilion construction, trail construction, watershed restoration), all work will be stopped until the find is evaluated by a qualified archaeologist.

Special Areas Designation and Management

Sections 201 and 202 of the Federal Land Policy Management Act (FLPMA) require that BLM “prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including, but not limited to, outdoor recreation and scenic values), giving priority to areas of critical environmental concern.” Based on such inventory, several potential special area designations may apply to part or all of the Reserve. This plan therefore addresses qualifications of Reserve lands for special designations and the implications to Reserve management of special designations. Potential special-area designations for some or all of the Reserve include

- Area of Critical Environmental Concern/Research Natural Area,
- Special Recreation Management Area,
- National Register of Historic Places,
- Wilderness Study Area,
- National Wild and Scenic River System, and
- State of California Ecological Reserve.

Area of Critical Environmental Concern/Research Natural Area

Background

Area of Critical Environmental Concern (ACEC) is a type of special area recognized by BLM for elevating management needs and funding for public lands supporting unique and sensitive environmental resources that may be threatened with degradation or loss. An ACEC is an area for which special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish or wildlife resources, or other natural systems or process, or to protect life and safety from natural hazards.

Research Natural Areas (RNA's) are areas that contain important ecological and scientific values and are managed for minimum human disturbance. RNA's are primarily used for non-manipulative research and baseline data gathering on relatively unaltered community types. Since natural processes are allowed to dominate, RNA's also make excellent controls for similar communities that are being actively managed. In addition, RNA's provide an essential network of diverse habitat types that will be preserved in their natural state for future generations.

By nature of its establishment (chapter 5), the entire Reserve is considered to be an ACEC/RNA. The Reserve supports a unique old-growth forest of coastal redwoods and Douglas-fir and a unique forest understory comprising a great diversity of nonvascular plants. It provides freshwater habitat for three endangered anadromous fish species and nesting habitat for two endangered bird species—the marbled murrelet and the spotted owl. Approximately 25% of the reproductive activity of marbled murrelet in the southern Humboldt region occurs at the Reserve, and the Reserve is the southernmost extent of the bird's nesting habitat in Northern California. These values could easily be degraded through unrestricted human visitation. As an ACEC/RNA, the Reserve will have a primary use of non-manipulative research and baseline data gathering, and serve as a control for similar vegetation communities that are being actively managed

Management Goals and Direction

ACEC/RNA designation is consistent with the desired outcome of all of the management programs addressed by this plan. Similarly, designation does not impose any additional management direction—either restrictions on allowable uses or needed management actions—to that direction prescribed in the other sections of this chapter. As noted, however, ACEC/RNA designation will elevate management funding priority in the nationwide funding system for BLM-managed lands. The ACEC/RNA designation is common to all alternatives.

Implementation Guidelines

None.

Special Recreation Management Area

Special Recreation Management Area (SRMA) is a type of special area recognized by BLM for purposes of elevating management needs and funding for lands that require special management of recreation activities. These are areas that require special management attention due to a concentration of recreation uses or values, contain Congressionally or administratively designated areas, have similar or interrelated recreation values that require a substantial management commitment, or have recreation as a principle management objective identified through the land use planning process.

Recreation demand for the Reserve is significant, because of both the proximity to the Humboldt Bay urban area and the statewide and national attention focused on it during its creation. The legislation creating the Reserve requires that this plan address providing recreation opportunities and ensure that recreation facilities be the minimal necessary so as to maintain ecological integrity of the Reserve. Therefore, any recreation provided for in the Reserve (see “Recreation Access Management” above) must be managed carefully to ensure preservation of the Reserve’s unique environmental values. Such management will require a significant management presence and restricted scheduling of management actions – both of which will require special funding priority.

Management Goals and Direction

As with ACEC/RNA designation, SRMA designation is consistent with the desired outcome of all of the management programs addressed by this plan. Similarly, designation does not impose any additional management direction—either restrictions on allowable uses or needed management actions—to that direction prescribed in the other sections of this chapter.

Implementation Guidelines

None.

National Register of Historic Places

As previously noted, listing on the NRHP under section 106 of the National Historic Preservation Act is a means of recognizing the cultural value of an extant historical resource and of providing for its legal protection. Candidate resources are evaluated by BLM and, if certain criteria are met, nominated for inclusion on the register. Actual designation is determined by a state, federal, or tribal Historic Preservation Officer. For listed properties, cultural resources management plans must be prepared.

Three historical properties at the Reserve qualify for and will be nominated to the register. They include the townsite of Falk and the abandoned railroad, both in the Elk River corridor, and the historic military ridge trail that traverses the major ridge and old-growth grove of the Reserve. Management goals, direction, and implementation guidelines are described in the “Cultural Resources” section of chapter 4.

Wilderness Study Area

Consistent with provisions of FLPMA Section 202, public lands having wilderness characteristics are evaluated for candidacy for inclusion in the national Wilderness System through a specific process described in BLM’s wilderness inventory and study procedures handbook (DOI BLM 2001). A two-part process—inventory and study—can result in the designation of a Wilderness Study Area (WSA). WSA designation imposes specific management restrictions on designated lands (DOI BLM 1995b), and thereby preserves the WSA in such a condition that Congress may consider including the area in the national Wilderness System.

Management Goals and Direction

When the Wilderness inventory step was applied to the Reserve (appendix G), it resulted in a finding that a 5,885-acre area of the Reserve (80%) could meet the minimum size requirement for a WSA. This area was then subjected to the Wilderness study step (appendix G). After this evaluation of the quality of wilderness values, and in particular, the degree of naturalness of various parts of this area, manageability, and other resources and uses, three alternatives for WSA designation were identified:

- all of the inventoried area,
- all except areas of the most recent logging (shrub sapling harvested and pole harvested seral stages excluded), or
- none of the area.

These alternatives and their management implications (e.g., curtailment of forest restoration actions, prohibition of bicycle use) are described in chapter 5; consequences of these alternatives are described in chapter 6.

Implementation Guidelines

Guidelines for managing lands under wilderness review are found in BLM Manual section H-8550-1 (DOI BLM 1995b).

National Wild and Scenic River System

The Wild and Scenic Rivers Act of 1968 (PL 90-542, as amended) established a method of providing federal protection of remaining free-flowing rivers and preserving them and their immediate environments for the use and enjoyment of present and future generations. Section 5(d)(1) of the Act provides that wild and scenic river considerations be made during Federal agency planning. Either Congress, or the Secretary of the Interior, upon the nomination of the Governor of the State of California, may designate rivers as part of the National Wild and Scenic River System (NWSRS). Pursuant to this mandate, an evaluation of river resources within the Reserve was conducted according to the three steps of the NWSRS study process (appendix H):

- Determine what rivers or river segments are eligible for NWSRS designation.
- Determine the potential classification of eligible river segments as wild, scenic, recreational, or any combination thereof.
- Conduct a suitability study to determine if the river segments are suitable for inclusion in the NWSRS.

Management Goals and Direction

The study (appendix H) resulted in a finding that all three perennial streams in the Reserve are eligible and potentially suitable for inclusion:

- South Fork Elk River (1 mile recreational, six miles scenic);
- Little South Fork Elk River (5 miles wild); and
- Salmon Creek (5 miles scenic).

Upon study of suitability, two alternatives for inclusion were identified: include all three streams or include none of them. These alternatives, and their management implications are described in chapter 5. Consequences of these alternatives are described in chapter 6. In the case of the Reserve, inclusion of these streams in the NWSRS would neither restrict any allowable uses nor require any management actions other than those already proposed for the Reserve in other sections of this chapter, regardless of what alternatives are chosen for restoration, recreation access, or other program areas.

Implementation Guidelines

General guidelines for managing components of the NWSRS are found in the Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended). The law calls for development of a specific management plan for each river included in the system. Before a management plan is completed, interim management guidelines for designated Wild and Scenic Rivers would be applicable (DOI BLM 1992).

State of California Ecological Reserve

The State of California establishes ecological reserves to provide protection for rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. The California Fish and Game Commission enacts the designations.

Management Goals and Direction

Two alternatives related to ecological reserves are available: designation or no designation. These alternatives and their management implications are described in chapter 5; consequences of these alternatives are described in chapter 6. Designation would preclude hunting, camping, fires, swimming, and operation of aircraft or hovercraft in the Reserve, unless these uses are expressly provided for in designation action.

Implementation Guidelines

Guidelines for management of ecological preserves are found in the California Administrative Code for the Fish and Game Commission under Title 14, section 630 (Appendix I).

Off-Highway Vehicle Designations

Consistent with the provisions under FLPMA and other authorities listed in 43 CFR 8340.0-3, public lands must be designated as open, limited, or closed with respect to the use of off-highway vehicles.

Management Goals and Direction

Off-highway vehicle use within the Reserve is considered inconsistent with the legislated priority of preservative of ecological integrity. The Reserve is designated as closed to the use of off-highway vehicles per 43 CFR 8242.2.

Implementation Guidelines

None

Resource Monitoring and Evaluation

This section describes resource monitoring and evaluation that will be conducted by BLM and DFG as a part of implementation of this plan.

Management Goals

The desired outcome of resource monitoring and evaluation is a clear understanding of the ecological structures, function, and processes that characterize the Reserve and the effects of human intrusion on those attributes. Accordingly, the management goals for the monitoring and evaluation program are as follows:

- Provide the basis for long-term adaptive management and ongoing planning.
- Assess compliance with environmental laws.
- Ensure that direction in the authorizing legislation to maintain ecosystem integrity at the Reserve is fulfilled.

The primary environmental laws of concern are ESA, CESA, and mitigation monitoring requirement of CEQA. Regarding the former, the proposed actions described in this chapter were developed in a manner to preclude the occurrence of significant environmental impacts caused by plan implementation; thus, no additional mitigation measures are required (see chapter 6, “Environmental Consequences (Environmental Effects and Alternative Comparisons)”). Technically, therefore, no monitoring of mitigation implementation monitoring is required under CEQA other than the monitoring required for the other purposes described above.

Management Direction

Monitoring

Table 4-7 describes the anticipated monitoring requirements for plan implementation. These requirements are arranged by program area (e.g., species management, watershed restoration, forest restoration, fire management), according to the attribute to be monitored. Monitoring results for one program area, however, will be of concern to other program areas, as indicated by the assessment of environmental consequence in chapter 6. The table presents the following elements for the attributes to be monitored:

- attribute to be monitored,
- monitoring purpose,
- specific indicator(s) of attribute to be measured,
- appropriate frequency and duration of measurement, and
- monitoring results indicating a need for reevaluation of management actions.

Evaluation and Adaptive Responses

Monitoring results will be evaluated immediately upon collection each year and annually reevaluated as an integrated whole preceding the budget planning process. Because the purpose of monitoring is to guide plan implementation, a detailed evaluation and an adaptive response will be developed when monitoring results indicate that undesired outcomes are occurring. These adaptations may require a refinement or modification of planning direction in this chapter. If a significant management modification is indicated, an amendment of this plan may be required (see chapter 1, “Introduction”). Significance is usually associated with monitoring results that

Table 4-7. Monitoring Needs for Plan Implementation

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
Species Management				
Corvid abundance	Determine corvid abundance trends	Number of corvids present on summer mornings, in point-count stations located at Salmon Pass, Alicia Pass, Elk River Corridor, Little South Fork Elk River trail area, and Elkhead Springs area	Semimonthly in summer for three years	Upward trend in corvid counts in action areas versus control areas attributable to reserve management
Marbled murrelet nesting activity	Determine murrelet use	Detections at established stations using established protocols, radar, or other methods	Every five years	Downward trend in sightings
Spotted owl nesting activity	Determine owl use	Number and success of established territories using established protocols at known sites	Every five years	Downward trend in number of territories or nesting attributable to reserve management
Watershed and Forest Restoration				
Potential sediment yield	Determine if precipitation and runoff conditions pose threat of imminent mass failures	Conditions throughout abandoned road system during wet season	Annually during early period of substantial rainfall, until restoration program is complete	Any threat of imminent mass failure
Actual sediment yield	Determine if stream sediment loads decrease as a result of forest and watershed restoration	Summer pool depth and volume at selected pools	Annually until restoration program is complete; final measurement 10 years later	No change or Statistically significant decreasing trend in depths and volumes
		Turbidity at stations on each of the three headwater streams during rising hydrographs (Elkhead Springs, Lower Little South Fork, Salmon Creek)	First rainstorm and monthly during wet season, annually following completion of restoration program for five years; final measurement 10 years later	No change or Statistically significant increasing trend in turbidity

Table 4-7. Continued

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
Forest stand conditions	Determine if density management is accelerating restoration of old-growth forest characteristics	Tree heights, diameters, tree form, and forest litter in sampling plots at sites established for a continuous forest inventory (Strata or locations selected to focus on old-growth buffers and fragmentation, and to compare results of different thinning treatments)	Every five years until restoration program is complete; final measurement 10, 20, and 30 years later	No statistically significant difference in growth rates or stand attributes between treated and untreated stands
Nonnative invasive plants	Determine if invasive nonnative plants are decreasing or increasing	Extent of nonnative plants in the Reserve, focused on invasive species	Every five years in perpetuity	Any increase
Aquatic habitat access	Determine if changes in range of anadromy occur in Salmon Creek	Species present in various reaches	Every five years until restoration program is complete; final measurement 10 years later	Any decreases in ranges of anadromy
Aquatic habitat conditions (optional)	Determine if changes in aquatic habitat conditions occur as a result of watershed and forest restoration	Fish spawning gravel grain sizes at selected locations in the three streams or their tributaries	Every five years until restoration program is complete; final measurement 10 years later	No change or Statistically significant departure of grain size distributions from spawning gravel size requirements
		Volume and frequency of large woody debris (LWD) in selected reaches of the three streams	Every five years until restoration program is complete; final measurement 10 years later	No change or Statistically significant decreases in volume or frequency of LWD
		Pool volume and frequency in selected reaches of the three streams	Every five years until restoration program is complete; final measurement 10 years later	No change or Statistically significant decrease in pool volume or frequency

Table 4-7. Continued

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
Research management				
Applicability of research	Determine if research is contributing to improved Reserve management	Conclusions of all research projects, with requirement that all researchers address applicability of research proposals and findings to Reserve management	Continuously	Frequent irrelevance
Impacts of research	Determine if research is adversely affecting ecosystem integrity	See <i>Species Management</i> above	--	--
Fire Management				
Fuel conditions	Determine if forest susceptibility to fire is decreasing with forest restoration	See <i>Forest Stand Conditions</i> above	--	--
Impacts of fire suppression	Determine if fire suppression is adversely affecting ecosystem integrity	Soil and watercourse disturbance following fire suppression activities	Immediately following a fire suppression incident	Any disturbance that can be countered by site restoration action
Recreation				
Visitation	Determine levels of visitation and extent of trail use	Number of persons entering the Reserve and destinations, seasonally, as registered in trailhead logbooks	Continuous compilation and annual summary	Visitation use level trend statistically higher than regional or statewide population growth; excessive concentration of use
Visitor compliance with restrictions	Determine visitor compliance with regulations	Number of warnings and citations issued by rangers, by type of violation (e.g., off-trail hiking, use of unauthorized means of transportation, littering food and other wastes, using fire, damaging vegetation)	Continuous compilation and annual summary	Statistically significant upward trend in any type of violation that exceeds trend in total visitation
Visitor safety and user conflicts	Determine if accident rates are changing	Number of reported accidents, by type (e.g., user collisions, falling, exhaustion, assault, dogbite)	Continuous compilation and annual summary	Any accident

Table 4-7. Continued

Attribute to Be Monitored	Purpose of Monitoring	Indicator to Be Measured	Frequency and Duration of Measurement	Results Indicating Need for Reevaluation of Management Actions
User conflicts	Determine if rates of user frustration are changing	Subject and content of visitor complaints about other visitors or their pets, as registered in trailhead logbooks, addressed to field rangers, or reported to Bureau of Land Management offices	Continuous compilation and annual summary	Statistically significant upward trend
Trail conditions	Determine if allowed means of travel are damaging trail systems and adjacent resources	Trail conditions in selected segments of sensitive trails, in terms of width, depth, apparent stability, erosion features and adjacent sediment deposition	Annually in perpetuity	More-than-minor trail damage to any segment, discounting natural effects of extreme precipitation events
Special-Areas Suitabilities				
Condition of special areas and resources	Determine if resource values that lead to designation are being preserved	Condition of resources listed on the National Register of Historic Places	Annual inspection and summary	Any damage or loss of value
		Condition of wilderness values in designated Wilderness Study Area(s)	Monthly inspection and summary	Any apparent loss of wilderness value
		Stream uses and conditions of designated Wild and Scenic Rivers	Annual inspection and summary	Any apparent loss of river value upon which designation was based
		Compliance with State of California Ecological Reserve regulations; see <i>Visitor compliance with restrictions</i> , above	Annual inspection and summary	More-than-minor level of violations of Ecological Reserve regulations
Note: Pacific Lumber Company (PALCO) is continuously monitoring various physical and biological attributes to meet requirements of its habitat conservation plan, and some of this monitoring is conducted in the Reserve (to establish reference conditions). Some of the monitoring needs identified in this table may be met through acquisition of PALCO's monitoring data.				

indicate management direction for various plan elements are inhibiting achieving management goals of another plan element (e.g., a significant conflict between recreation access and species management is developing). In such cases, the required adaptation will be formulated to give priority to the primary purposes for which the Reserve was created: maintenance of ecological integrity and preservation of old-growth ecosystems.

Implementation Guidelines

Monitoring

Table 4-7 lists implementation guidelines for monitoring. All monitoring and evaluation activities will be fully documented. Monitoring and evaluation reports should indicate monitoring methodologies, results, and conclusions. Conclusions will include assessment of measured results against expected results, implications to the prospect for meeting management goals in any program area, determination of acceptability of results, and formulation of measures that could bring about desired changes to monitored attributes.

Evaluation

Data from the resource monitoring and other sources will serve as input for a formal evaluation of the planning decisions to determine progress in implementation, and to see if any amendments or revisions to the plan are necessary (see chapter 1). The evaluation will be completed at least once every four years and will address the following questions (from BLM Handbook 1601-1):

- Are actions outlined in the plan being implemented?
- Does the plan establish desired outcomes (i.e., goals, standards, and objectives)?
- Are the allocations, constraints, and mitigation measures effective in achieving desired outcomes?
- Do decisions continue to be correct and proper over time?
- Have there been significant changes in the related plans of Indian tribes, state and local government, or other federal agencies?
- Are there new data or analysis that significantly affect the planning decisions or the validity of the NEPA analysis?
- Are there unmet needs or opportunities that can best be met through a plan amendment or revision, or will current management practices be sufficient?
- Are new inventories warranted pursuant to BLM's duty to maintain inventories on a continuous basis (FLPMA Section 201)?
- Are there new legal or policy mandates as a result of new statutes, proclamations, executive orders, or court orders not addressed in the plan?

Management Revenue and Expenditures

Management Goals

The desired outcomes and management goals for the revenues and expenditures program described in this plan are that plan implementation is fully funded and executed in the most cost-effective manner and that revenues to support Reserve management are provided primarily by governmental appropriations or grants and donations, and less so from visitation.

Management Direction

Funding of Plan Implementation

Full implementation of the proposed plan will be sought and will include completion of the selected watershed restoration program and forest restoration program within five years of final plan approval and construction of the selected trail system, including required appurtenant facilities, within three years of plan approval. The monitoring program will be implemented in the first year of plan adoption and will continue annually. Table 4-8 shows estimated costs for management of the Reserve, including one-time costs, such as for restoration or trail construction, and ongoing annual costs. Depending on the restoration and access alternatives selected, remaining one-time costs range from \$3 million to \$7.2 million. Annual operating costs are estimated to be \$530,000–\$570,000.

The current interagency agreement for funding of the Reserve includes a 2/3 to 1/3 split between the federal and state government in responsibility for public funding of both the one-time development of the Reserve and the annual management costs in perpetuity. Contributions and grants from sources will continue to be sought to help meet costs of restoring and improving the Reserve.

Efficiency of Management

The most cost-effective means of fully implementing the plan will be used. Direct management authority will reside with BLM's Arcata Field Office. The Field Manager will direct plan implementation. Staff specialists in watershed and forest restoration, recreation services, ecosystem preservation, and management services will oversee plan implementation. DFG will provide financial support and advice to the BLM Field Manager. In accordance with the MOU between BLM and DFG, and the State of California conservation easement over the Reserve, major decisions affecting the Reserve will be made jointly by BLM and DFG.

BLM will undertake plan improvements (i.e., watershed restoration, forest restoration, and construction of recreation facilities) by using contractors conducting business in the geographic area encompassed by the Northwest Forest Plan. Design of implementation projects may be done in-house or by use of contractors, whichever is most cost effective. Cost effectiveness includes consideration of both least cost and degree of attainment of quality and schedule goals. Contractors may be either nonprofit or for-profit contractors.

Table 4-8. Costs of Reserve Management

	One-Time Costs (1,000s of \$)	Annual Costs (1,000s of \$)	Comments and Effects of Alternatives
Reserve Management			
General management	N/A	550	
Access	N/A	75	
Restoration planning	100	0	
Management planning	50	0	
Restoration			
Watershed restoration	1,523–3,994	0	Alt 1A (recontour) = 3,994 and Alt 1B (stabilize) = 1,523 ^a
Forest restoration	592–1,745	0	Alt 2A (medium intensity) = 1,745 and Alt 2B (low intensity) = 592 ^b
Exotic plant control	100	10	
Recreation			
Trail construction and maintenance	300–900	10–50	Construction: Alt 4A (extensive) = 14.4 miles new trail Alt 4B (limited) = 5.5 miles new trail Alt 4C (max preserve) = 2.9 miles new trail Annual trail maintenance: Alt 6A = 5.6 miles horse use Alt 6B = 2.9 miles horse use
Cultural site restoration/stabilization	200	10	
Facilities construction/maintenance	500	10	Parking/trailhead improvements, pavilion
Interpretation	0	100	
Fire Management			
Suppression	10	0	
Research, Monitoring, and Inventory			
Research and monitoring	125	40	
Resource inventory	10	10	
Total costs	3,510–7,734	730–770	

Note: A financial plan, as directed by the enabling legislation for the Reserve, was prepared and submitted to Congress (DOI BLM n.d.). This table updates that plan to reflect costs proposed in this management plan.

^a Pacific Watershed Associates 2001.

^b Acreage treated X \$700 per acre. Alt 2A both sapling and pole stands = 2,493 acres. Alt 2B sapling stands only = 846 acres.

Use Fees

In addition to contributions, costs of plan improvements will be met by federal-state appropriations, because these actions are logical extensions of the federal-state acquisition. These costs include costs for watershed restoration, forest restoration, and construction of recreation facilities. For meeting annual operation costs in perpetuity, some reliance upon Reserve visitors may be considered.

Alternatives for the charging of fees for interpretative/educational use are described in chapter 5. They include four alternatives:

- **Universal user fee.** All users of the Reserve would be charged a daily user fee.
- **Guided hike user fee.** Users of the Reserve participating in guided hikes would be charged a tour fee (or would donate labor).
- **Independent user fee.** All users of the Reserve, except those participating in guided hikes, would be charged a daily user fee.
- **No fees.** Fees would not be assessed for entry into the Reserve.

One of these alternatives will be selected for final plan adoption. A partial or complete waiver of fees may be granted to educational organizations, depending on costs to be incurred by BLM.

The appropriate public use fees and implementation guidelines at the initiation of the plan-implementation period for recreation access would be determined on the basis of a fee study and business plan developed with public input and community support. At the present, fees are expected to be approximately \$3–5 per day, or \$40 annually, for walking access and \$5–10 per day, or \$40–80 annually, for bicycle and equestrian access, if a fee alternative is selected.

Researchers at the Reserve may be charged a fee for covering BLM's costs for processing of research permits. Fees will be established according to an application-specific cost estimate provided by BLM to applicants prior to application submittal and processing. A preapplication meeting between the applicant and agency staff will be required to establish the fee.

Chapter 5. Management Alternatives



Chapter 5. Management Alternatives



Introduction

Several alternative management actions for the Reserve are described in this chapter. A summary list of alternatives is provided in table 5-1. These alternatives were formulated by an analysis of the management situation, an issue-scoping process directed at affected agencies and the public, and several subsequent planning analyses. A scoping report details the issues raised during the scoping process (Jones & Stokes 2000), and chapter 2 describes the legal framework within which this plan must fit. The alternatives in this plan are formulated around the major public issues identified. Alternatives described in this chapter would feasibly achieve the management goals stated in chapter 4, but with different levels of goal attainment and environmental and social impacts. Chapter 4 also describes management actions common to all alternatives. The choices involved in selecting alternatives for implementation are described in this chapter. Chapter 6 is an assessment of the environmental consequences of each of these alternatives.

Potential management alternatives were initially formulated but later eliminated from detailed consideration (appendix J). Reasons for elimination include significant disturbance to the Reserve's resources, inappropriate use of the Reserve lands, incompatibility with adjoining landownership, inability of the land to support needed infrastructure, and user safety. Key program areas warrant the consideration of alternatives:

- Restoration of Old-Growth and Aquatic Ecosystems,
- Recreation Management,
- Special-Area Designations, and
- Management Revenue.

Ten issues have been identified for these program areas, and alternatives have been formulated for each. Alternatives for each program area and issue are separately formulated because they are generally independent of alternatives for other program areas and issues.

Some program areas do not require alternatives, although management direction for them is included in this management plan (chapter 4). These additional areas are common program areas for all alternatives.

- Species Management (existing requirements for protection of endangered species),
- Research Management,
- Fire Management, and
- Resource Monitoring and Evaluation.

Restrictions on various activities that are required for the conservation and recovery of threatened and endangered species (northern spotted owl, marbled murrelet, steelhead, and salmon) are not considered discretionary and have therefore not been subjected to alternatives formulation. These restrictions are described in the “Species Management” section of chapter 4.

For all management issues, the No-Action Alternative corresponds to current management as established by the *Federal Register* notice of Interim Management Guidelines (March 19, 1999), *Headwaters Forest Reserve: Public Access (South)* (Environmental Assessment #AR-99-15), and *Watershed Restoration and Sediment Reduction for FY 2000–FY 2002* (Environmental Assessment #AR-00-03). A preferred alternative for each issue is also indicated. It should be noted that flexibility will remain with the Record of Decision (ROD) to adopt a final management alternative for each program issue that is within the range of actions addressed by the particular alternatives formulated in this chapter.

Alternatives for Restoration of Old-Growth and Aquatic Ecosystems

Two issues have been identified for which alternative resolutions are consistent with the overall purpose of forest ecosystem recovery and preservation: intensity of watershed restoration and intensity of forest restoration.

Intensity of Watershed Restoration

Issue

What level of watershed restoration should generally be pursued?

Alternative 1A: Full-Recontour Watershed Restoration (Preferred)

Most roads and landings having significant sediment yield would be fully recontoured where appropriate and feasible to natural topography and would be revegetated.

Alternative 1B: Hydrologic-Stabilization Watershed Restoration

Roads and landings having significant sediment yield would be reconfigured only as necessary to minimize sediment yield and would be revegetated.

Table 5-1. Summary of Management Alternatives

Watershed Restoration Alternatives

Alternative 1A: Full-Recontour Watershed Restoration (Preferred)

Alternative 1B: Hydrologic-Stabilization Watershed Restoration

Alternative 1C: No Additional Watershed Restoration (No Action)

Forest Restoration Alternatives

Alternative 2A: Moderate-Intensity Forest Restoration (Preferred)

Alternative 2B: Low-Intensity Forest Restoration

Alternative 2C: No Forest Restoration (No Action)

Recreation Management Alternatives: Southern Access

Alternative 3A: Southern Access Available to Individual Vehicles

Alternative 3B: Southern Access Confined to BLM Tours (No Action; Preferred)

Alternative 3C: No Southern Access

Recreation Management Alternatives: Trail System

Alternative 4A: Extensive Old-Growth Contact Experience

Alternative 4B: Limited Old-Growth Contact Experience (Preferred)

Alternative 4C: No Old-Growth Contact Experience; Maximum Preservation of Old-Growth Forests

Alternative 4D: Existing Trail System (No Action)

Recreation Management Alternatives: Bicycle Use

Alternative 5A: Bicycle Use on Wider Trails

Alternative 5B: Bicycle Use in Elk River Corridor

Alternative 5C: No Bicycle Use (No Action; Preferred)

Recreation Management Alternatives: Equestrian Use

Alternative 6A: Equestrian Use on Trails Accessed from Elk River Trailhead

Alternative 6B: Equestrian Use on Elk River Corridor Trails

Alternative 6C: No Equestrian Use (No Action; Preferred)

Special-Area Designation Alternatives: Wilderness Study Areas

Alternative 7A: Entire Wilderness Inventory Area Designated WSA

Alternative 7B: Exclude Younger Harvested Stands from WSA Designation (Preferred)

Alternative 7C: No WSA Designation (No Action)

Special-Area Designation Alternatives: Wild and Scenic Rivers

Alternative 8A: All Eligible Streams Recommended for Wild and Scenic River Designation

Alternative 8B: No Stream Recommended for Wild and Scenic River Designation (No Action; Preferred)

Special-Area Designation Alternatives: Ecological Reserve

Alternative 9A: Ecological Reserve Designation Recommended (Preferred)

Alternative 9B: No Ecological Reserve Designation Recommended (No Action)

Management Revenue Alternatives

Alternative 10A: Universal User Fee

Alternative 10B: BLM-Sponsored Tour User Fee (Preferred)

Alternative 10C: Non-Tour User Fee

Alternative 10D: No Fees (No Action)

Alternative 1C: No Additional Watershed Restoration (No Action)

Beyond watershed restoration actions through Year 2002 in accordance with the environmental assessment and ROD completed August 11, 2000, no further watershed restoration actions would be conducted.

Intensity of Forest Restoration

Issue

What intensity of density management should be conducted in harvested stands to accelerate restoration of old-growth forests?

Alternative 2A: Moderate-Intensity Forest Restoration (Preferred)

Density management would be conducted in pole stands, sapling/shrub stands, and openings in seed-tree harvested stands. Two to three entries on acreage currently in sapling/shrub stands and openings and in revegetated watershed-restoration sites would be made as needed. A single entry would be made on acreage currently in pole stands considered appropriate for such action.

Alternative 2B: Low-Intensity Forest Restoration

Density management would be conducted only in sapling/shrub stands and openings in seed-tree harvested stands, and in revegetated watershed-restoration sites, limited to one entry.

Alternative 2C: No Forest Restoration (No Action)

No forest restoration actions would be taken.

Alternatives for Recreation Management

Four issues have been identified that can be addressed in alternative ways: availability of access to the southern trailheads, the network of trails that support recreation access without compromising ecological integrity of the Reserve, and the extent of use of the trail network by equestrians and bicyclists. The suite of potential trail routes is described in tables 5-2 and 5-3 and shown in figures 5-1 and 5-2.

Availability of Southern Access

Issue

Should access to the southern trailhead(s) be limited to escorted vehicles or guided hikes, or should access be available to unescorted individual vehicles at visitors' discretion (during daylight hours in annual periods that avoid disturbance to breeding northern spotted owl and marbled murrelet and damage to roads and trails)?

Alternative 3A: Southern Access Available to Individual Vehicles

Access to the Salmon Pass Trailhead, and to a Universal Access Trail and an Alicia Pass Loop Trail, if those trails were developed (see Issue 4 below), would be unrestricted during appropriate periods, allowing private vehicles to traverse the Felt Springs Road from Humboldt County's Newburg Road and allowing visitors to hike (or possibly bike - see Issue 5) unescorted on Reserve trails served by the southern access route. (Note: Alternative 5A below would require that this alternative be selected). Use of the Felt Springs Road would not be allowed during periods when seasonal or hourly trail closures for the southern trails are in effect.

Alternative 3B: Southern Access Confined to BLM Tours (No Action; Preferred)

Access to the Salmon Pass Trailhead, and to a Universal Access Trail and an Alicia Pass Loop Trail, if those trails were developed (see Issue 4 below), would be available to escorted vehicles that are a part of scheduled, guided interpretive hikes. Trail use would be limited to these guided tours.

Alternative 3C: No Southern Access

Public access to the Reserve would be available to the Elk River Trailhead accessible by Humboldt County's Elk River Road. No access to the southern boundary would be provided, and Humboldt County's Newburg Road and the Felt Springs Road would only be used for administrative purposes. This alternative would not be consistent with the legislation authorizing creation of the Reserve.

Extent of Trail System

Issue

What trail system on the Reserve would best balance the need to provide recreation access to the public, while preserving the unique values of old-growth forests consistent with the purpose for which the Reserve was created?

Alternative 4A: Extensive Old-Growth Contact Experience

Opportunities would be provided for passing through old-growth forest for a considerable distance (table 5-3, figure 5-1). All potential trail routes shown in figure 5-1 would be available to visitors, subject to seasonal and hourly restrictions, with the Historic Military Ridge Trail providing sustained contact with the old-growth forest, and the Alicia Pass Loop Trail and the Western Periphery Trail also providing considerable contact. Overnight camping at a designated primitive campsite would be allowed.

Alternative 4B: Limited Old-Growth Contact Experience (Preferred)

Opportunities would be provided for limited contact with old-growth groves at both the north and south portions of the Reserve, subject to seasonal and hourly restrictions (table 5-3, figure 5-1).

Table 5-2. Existing and Potential Components of a Recreation Trail System for the Headwaters Forest Reserve

Description		Distance (one-way) (miles)	Gradient ^a
From Elk River Trailhead (Northern Access)			
Existing Elk River Corridor Trail (Trail #2)	A gentle-gradient trail from the Elk River Trailhead (at the terminus of Humboldt County's Elk River Road) along the South Fork of the Elk River to near the confluence of the Little South Fork and the main South Fork.	2.9	Nearly level; 1% average; some variation
New Elk River Corridor Trail (Trail #2)	Under all alternatives except the No-Action Alternative (Alternative 4D), the existing Elk River Trail would be reconstructed and relocated in some segments and short spurs would be added to allow contact with the South Fork Elk River and historical sites along the corridor (e.g., Falk). Picnic tables would be provided at some of these spurs.	2.9	Nearly level; 1% average; some variation
Existing Little South Fork Elk River Trail (Trail #3)	A trail ascending the Little South Fork to near the existing boundary of the primary old-growth forest on the Reserve. The existing route is east of the river.	2.7	Average 10%
New Little South Fork Elk River Trail (Trail #6)	Under all alternatives except the No-Action alternative (Alternative 4D), the existing trail would be relocated to the west side of the creek and a loop would be constructed at the upper end that extends through an island of old-growth forest, disjunct from the primary old-growth grove. A round-trip hike around the loop from the Elk River Corridor Trail would be 3.7 miles.	2.0, east loop; 1.7, west loop	14%, east loop; 17%, west loop (would be reduced by switchbacks)
From Felt Springs Road (Southern Access)			
Existing Salmon Creek Trail (Trail #4)	An existing trail descending from the Salmon Pass Trailhead to above the inner gorge of Salmon Creek, then extending up the canyon of Salmon Creek where the primary old-growth grove can be continuously viewed. Entire roundtrip is nearly 4 miles.	1.9 (1.3 to river overlook; 0.6 up river canyon)	3% average, 12% maximum to river overlook; 2% up canyon
Salmon Creek Spur Trail (Trail #7)	A new trail from the existing Salmon Creek Trail, down a steep slope to a crossing of Salmon Creek at the edge of the primary old-growth grove.	0.1	50% ground slope requires switchbacks
Salmon Creek Trail Loops (Trail #8)	Two loops would be added to the Existing Salmon Creek Trail, returning visitors to the Salmon Creek Trailhead by different routes, while offering a shorter loop option from the parking area. These loops would allow round trips ranging from 2 to 3.6 miles. Contact with an isolated grove of old-growth forest would be provided for 0.4 miles along the shortest and longest loops.	0.7 and 1.0 new trail	0 to 11%

Table 5-2. Continued

	Description	Distance (one-way) (miles)	Gradient ^a
Universal Access Trail (Trail #9)	From the road between Salmon Pass and Alicia Pass, a new trail about 400 feet long into the edge of southern old-growth grove, providing wheelchair and walking access. A parking area would be developed at the trailhead.	0.1	Nearly level
Alicia Pass Loop Trail (Trail #1)	A gentle to moderately sloping loop trail, originating at Alicia Pass, passing through the southern old-growth grove for 0.6 mile, and returning to Alicia Pass.	0.8	Nearly level to moderately low grade
North-south through routes connecting Elk River Trailhead to Salmon Pass Trailhead			
Western Periphery Trail (Trail #10)	Connecting the New Little South Fork Elk River Trail to the Salmon Creek Spur Trail along the western boundary of the Reserve, passing through the edge of the main old-growth grove for 0.3 mile, with a designated primitive camping site in harvested forest near the junction with the New Little South Fork Elk River Trail.	1.6	9% between ridgetop and Salmon Creek
Historic Military Ridge Trail (Trail #5)	Connecting the Western Periphery Trail, at the edge of the main old-growth grove, to Alicia Pass, passing through the main old-growth grove for 2.4 miles along the ridge between the Elk River and Salmon Creek watersheds.	4.5	Gentle slopes on ridgetop; up to 15% across Salmon Creek canyon
Exhibition Routes			
Exhibition Routes	At various locations at various times to allow public tours to view various restoration project areas or other specific features, consistent with marbled murrelet and northern spotted owl nesting seasons and winter closure; would not involve physical trail development.	Various	Various

^a See profiles—figure 5-2

Table 5-3. Trail Routes of the Recreation Access Alternatives

Alternative	Trail										North–South Connecting Trails	
	Northern Access				Southern Access							
	Existing Elk River Corridor Trail ^c (#2)	New Elk River Corridor Trail ^{a,c,e} (#2)	Existing Little South Fork Elk River Trail (#3)	New Little South Fork Elk River Trail ^d (#6)	Existing Salmon Creek Trail (#4)	Salmon Creek Spur Trail (#7)	Salmon Creek Trail Loops (#8)	Universal Access Trail ^c (#9)	Alicia Pass Loop Trail (#1)	Western Periphery Trail ^b (#10)	Historic Military Ridge Trail ^b (#5)	
4A: Extensive Old- Growth Contact Experience		✓		✓	✓	✓	✓	✓	✓	✓	✓	
4B: Limited Old- Growth Contact Experience		✓		✓	✓	✓	✓	✓				
4C: No Old-Growth Contact Experience; Maximum Preservation		✓										
4D: Existing Trail System (No Action)	✓		✓		✓							

Note: Table 5-2 describes the trail routes and figure 5-1 depicts trail locations.

^a Picnic sites would be provided along the New Elk River Corridor Trail.

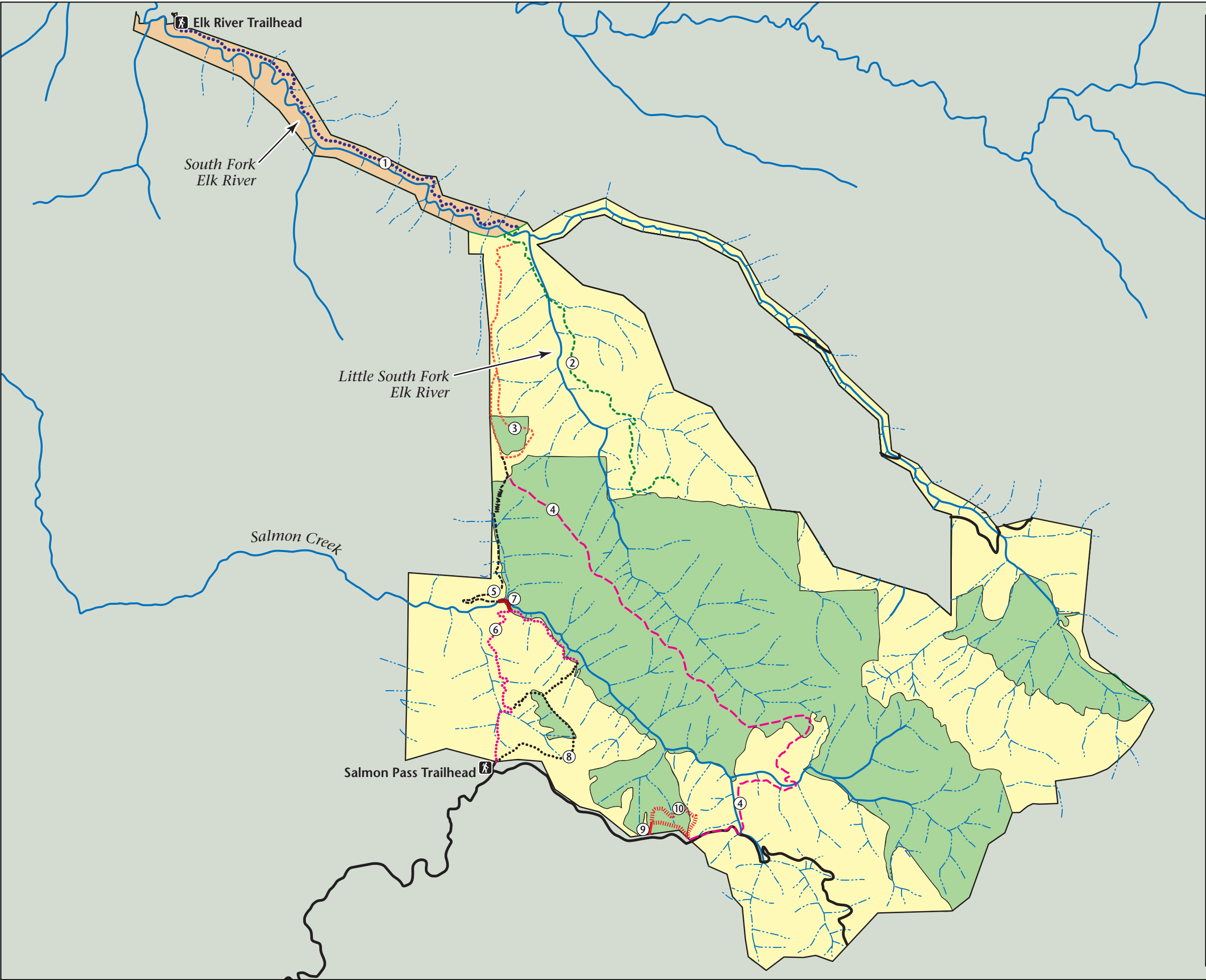
^b A primitive campsite would be provided near the junction with the New Little South Fork Elk River Trail (upper loop).

^c Wheelchair accessible; applies to the Elk River Corridor Trail (existing or new) to the historic townsite of Falk and to the Universal Access Trail.

^d The existing trail following an old road on the east side of the Little South Fork would be abandoned and a new trail would be constructed on the west side of the creek. A trail loop would be provided in the upper portion that enters old-growth forest for approximately 500 feet.

^e The existing trail width would be narrowed, with some relocated alignments.

Figure 5-1
Visitor Management Zones
and Potential Trail System
in the Headwaters Forest Reserve



Legend

- Reserve Boundary
- Perennial Streams
- - - Intermittent and Ephemeral Streams
- Permanent Roads
- 🚶 Trailheads

Visitor Management Zones

- Zone 1
- Zone 2
- Zone 3

Trails

- ① Elk River Corridor Trail (existing and new)
- ② Existing Little South Fork Elk River Trail
- ③ New Little South Fork Elk River Trail
- ④ Historic Military Ridge Trail
- ⑤ Western Periphery Trail
- ⑥ Existing Salmon Creek Trail
- ⑦ Salmon Creek Spur Trail
- ⑧ Salmon Creek Trail Loops
- ⑨ Universal Access Trail
- ⑩ Alicia Pass Loop Trail

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



0 2000 4000 6000 ft

Scale = 1:39,000 (1 in = 3250 ft)

Elk River Corridor Trail

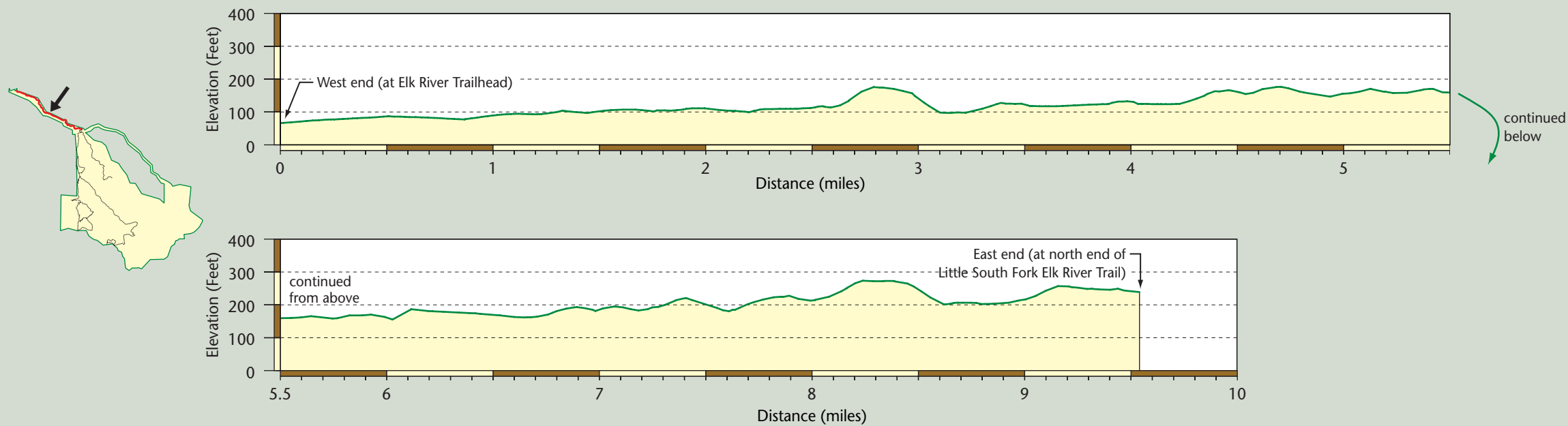
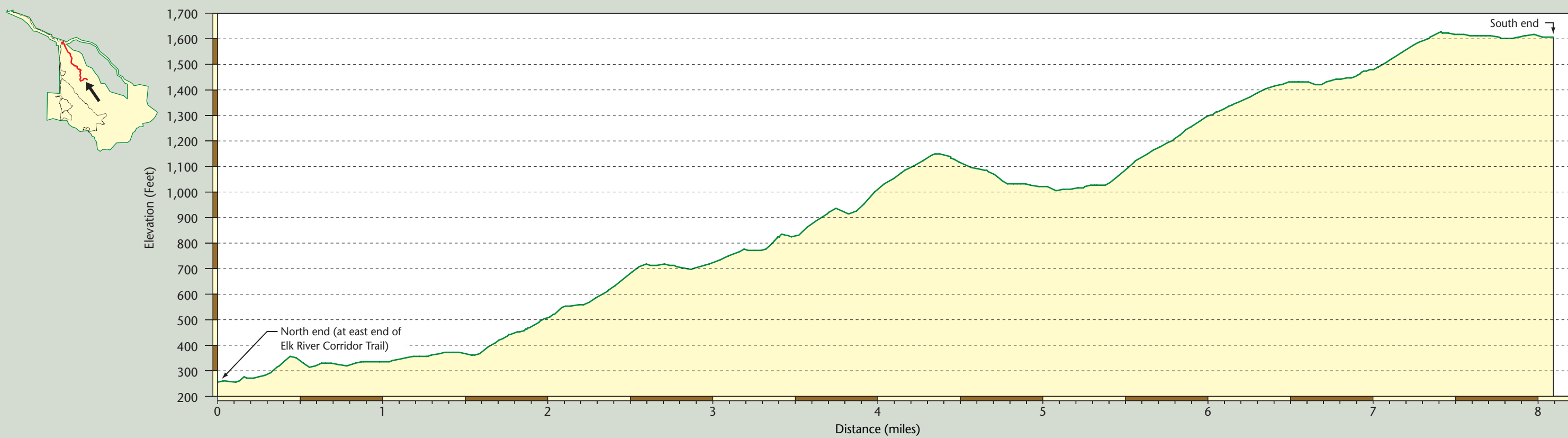


Figure 5-2a
Trail Profiles

Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



Little South Fork Elk River Trail (Existing)



New Little South Fork Elk River Trail

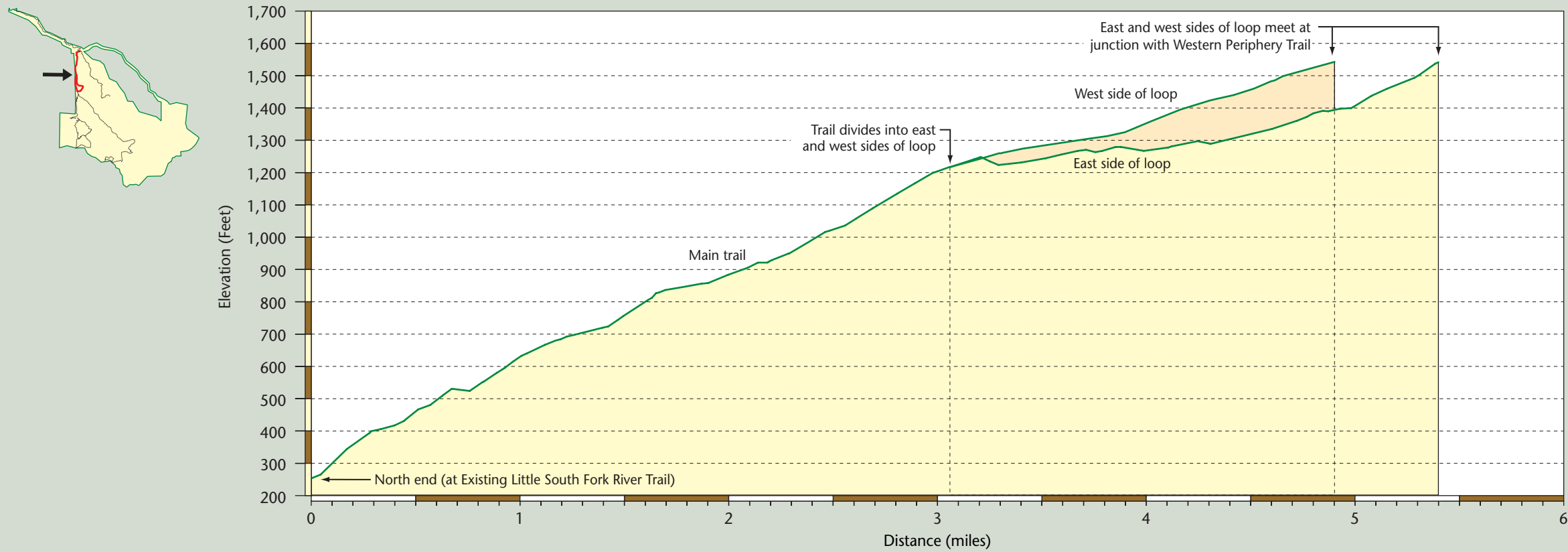
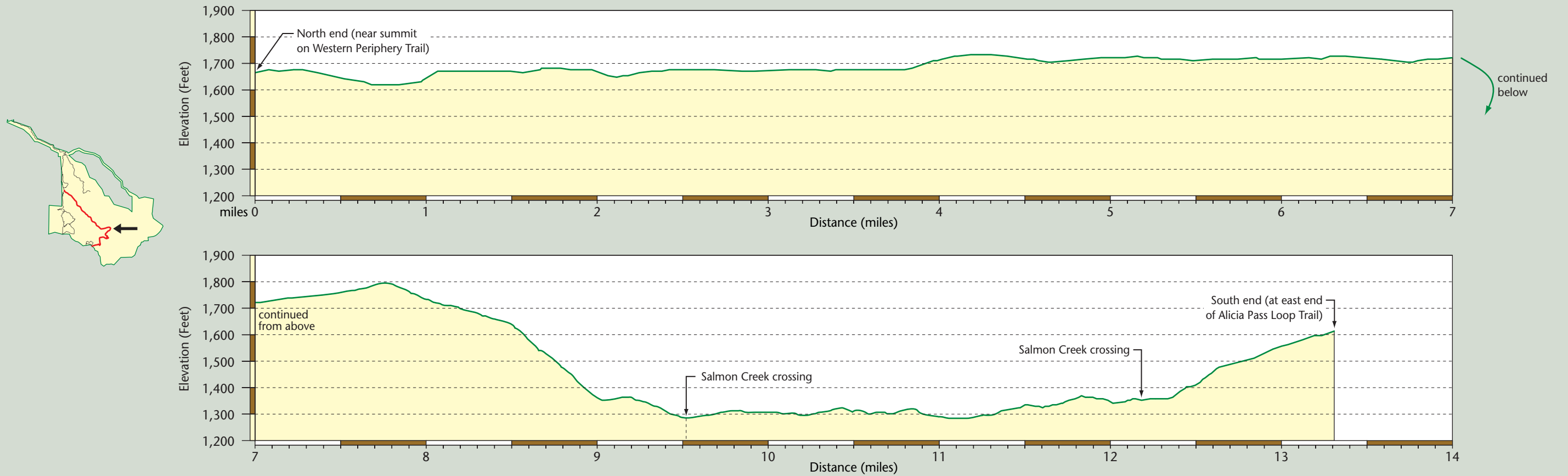


Figure 5-2b
Trail Profiles

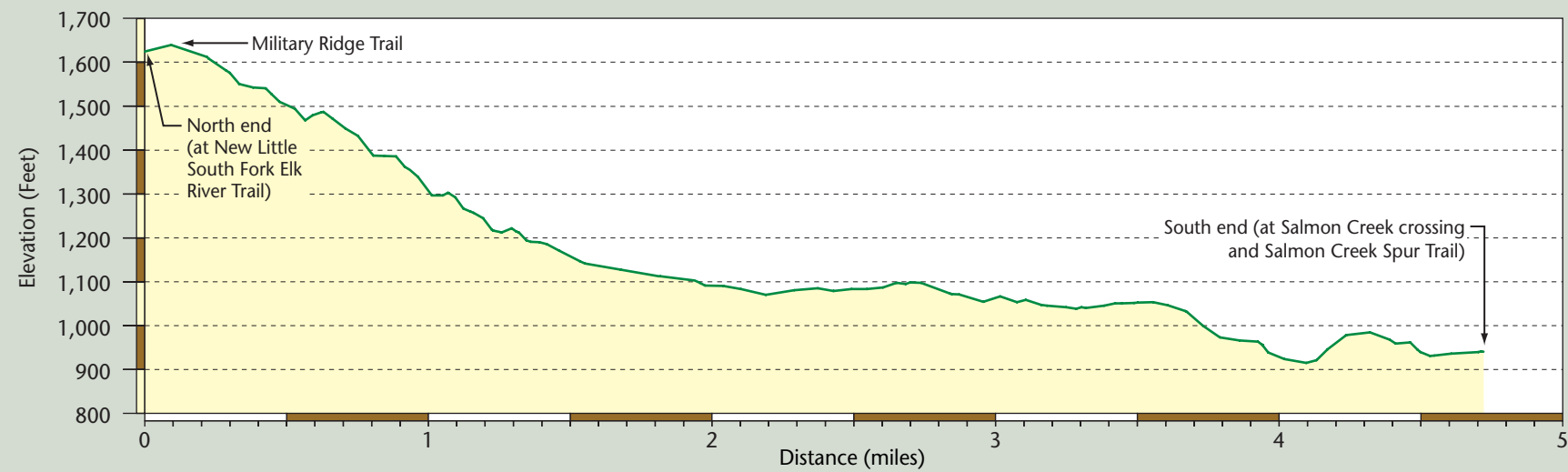
Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



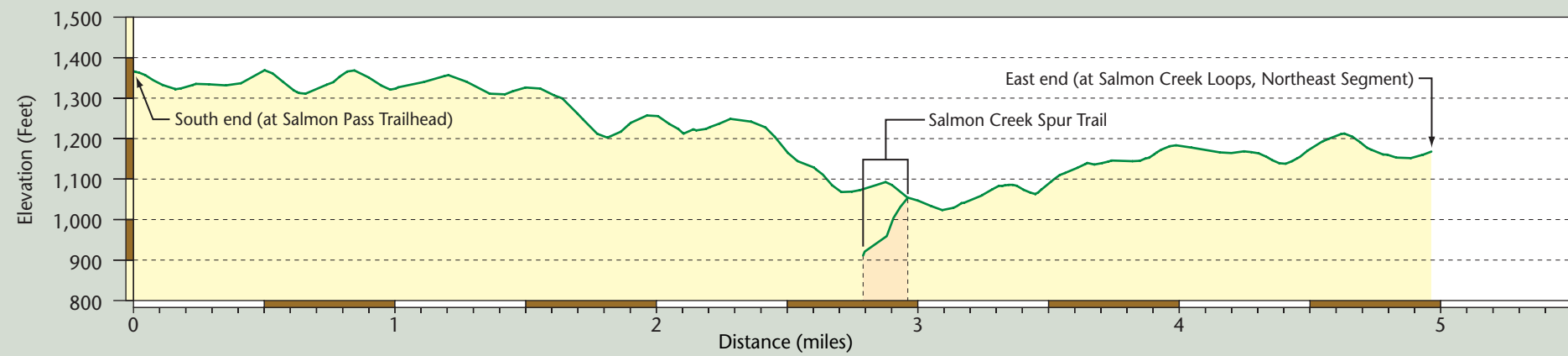
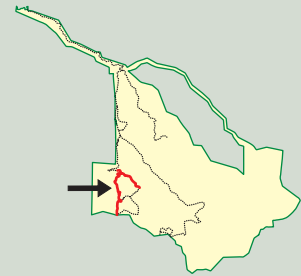
Historic Military Ridge Trail



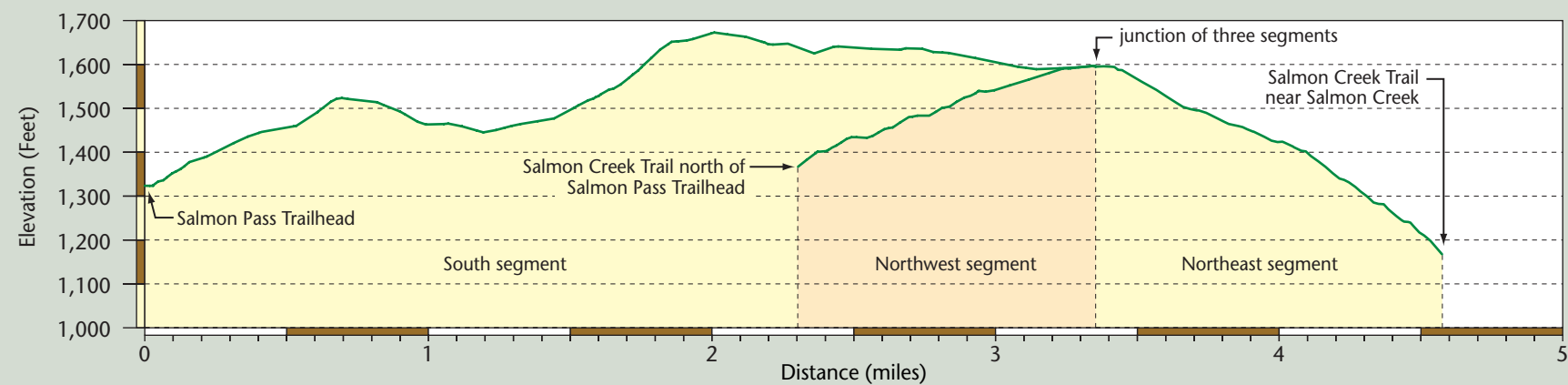
Western Periphery Trail



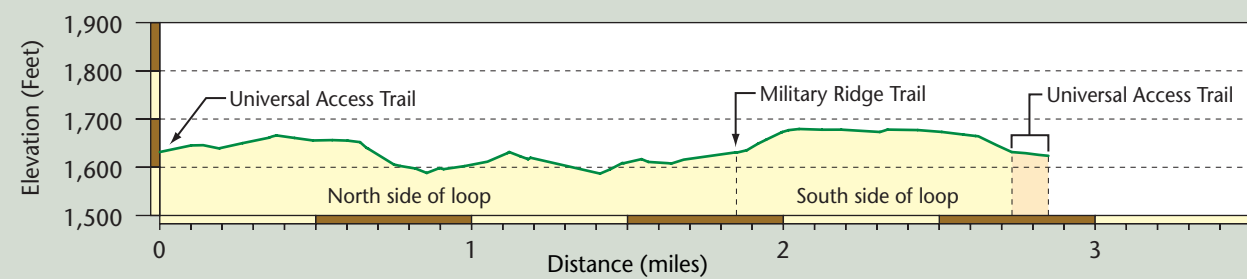
Salmon Creek Trail



Salmon Creek Trail Loops



Alicia Pass Loop Trail



The Universal Access Trail and the New Little South Fork Elk River Trail would provide contact with old-growth forests.

Alternative 4C: No Old-Growth Contact Experience; Maximum Preservation of Old-Growth Forests

Opportunities would be provided for experiencing riparian habitats of the Reserve, while preventing access to old-growth groves (table 5-3, figure 5-1). The New Elk River Corridor Trail would provide access to the riparian corridors in the northern portion of the Reserve. Use of the Little South Fork Elk River Trail and the Salmon Creek trail would be discontinued, as well as visitor access from the Newburg Road to the southern portion of the Reserve. This alternative would not be consistent with the legislation authorizing creation of the Reserve.

Alternative 4D: Existing Trail System (No Action)

The Existing Elk River Corridor Trail, Existing Little South Fork Elk River Trail, and the Salmon Creek Trail would continue to be available for Reserve access (table 5-3, figure 5-1).

Bicycle Use

Issue

Is bicycle use in portions of the Reserve consistent with ecosystem preservation and general public access for recreation purposes?

Alternative 5A: Bicycle Use on Wider Trails

Bicycling would be accommodated on widened trails or on former roadways where additional width is available to minimize user conflicts. Trails that would be open to bicycle use include the Elk River Corridor Trail (existing or new), the new Little South Fork Elk Trail, and the existing Salmon Creek Trail. (This alternative requires that Alternative 3A above be selected.)

Alternative 5B: Bicycle Use in Elk River Corridor

Bicycling would be accommodated on trails with gentle slope, i.e. the Elk River Corridor Trail (existing or new).

Alternative 5C: No Bicycle Use (No Action; Preferred)

Bicycle use would not be accommodated in the Reserve.

Equestrian Use

Issue

Is equestrian use in portions of the Reserve accessible from the Elk River Trailhead consistent with ecosystem preservation and general public access for recreation purposes?

Alternative 6A: Equestrian Use on Trails Accessed from Elk River Trailhead

Horseback riding would be accommodated on the network of trails accessible from the Elk River Trailhead, except the North-South Connecting Trails (Historic and Periphery Trails), if these trails are constructed. Available routes would therefore include the Elk River Corridor Trail (existing or new) and the Little South Fork Elk River Trail (existing or new).

Alternative 6B: Equestrian Use on Elk River Corridor Trails

Horseback riding would be accommodated on trails with gentle slope that parallel the Elk River, i.e., the Elk River Corridor Trail (existing or new).

Alternative 6C: No Equestrian Use (No Action; Preferred)

Horseback riding would not be accommodated in the Reserve.

Alternatives for Special-Area Designations

Wilderness Study Area

Issue

Should some portions or all of the Reserve be managed as a WSA under provisions of Sections 201 and 202 of the Federal Land Policy Management Act, to preserve wilderness characteristics that would allow future inclusion in the federal Wilderness System?

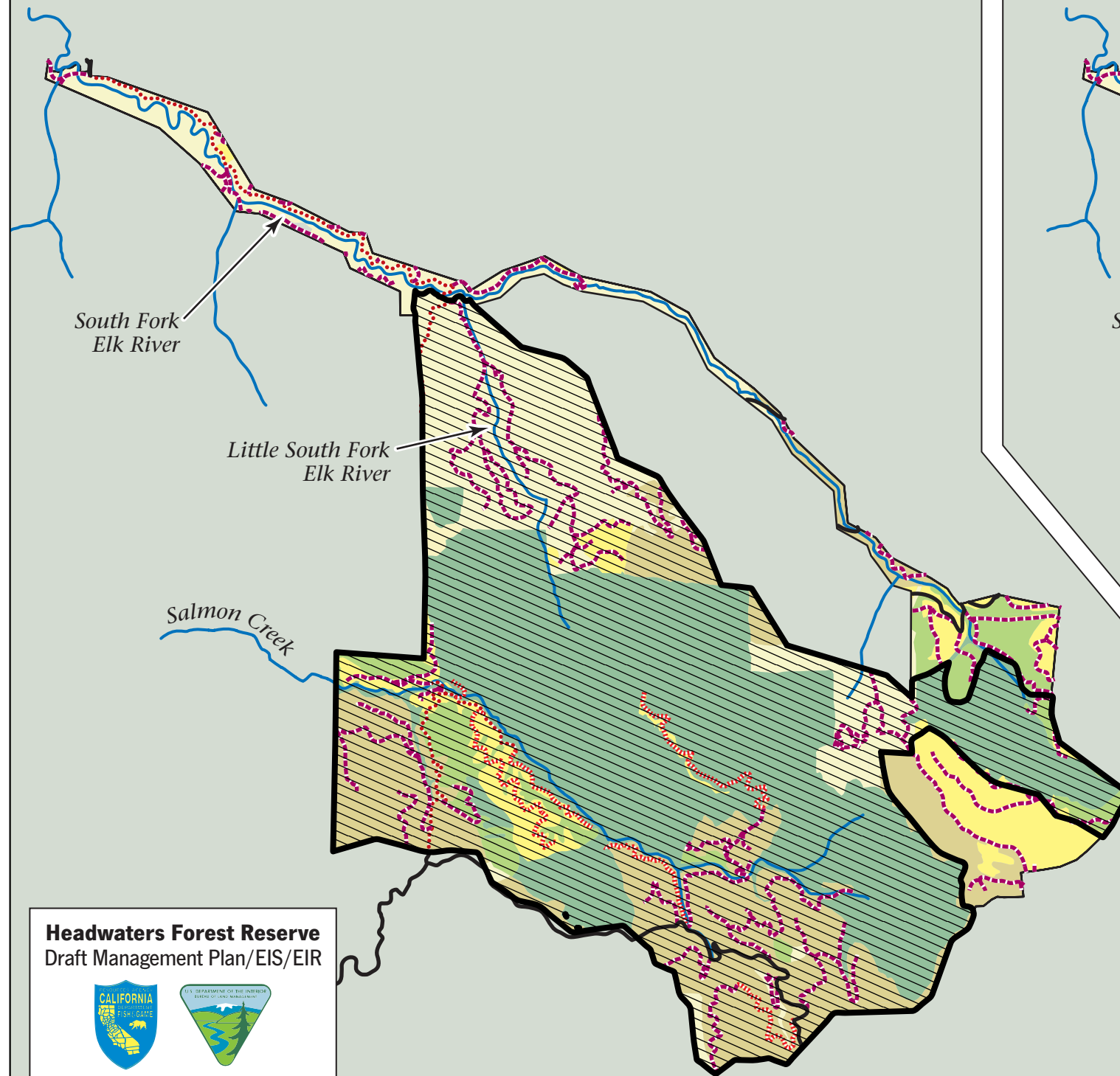
Alternative 7A: Entire Wilderness Inventory Area Designated WSA

The entire portion of the Reserve qualifying as a Wilderness Inventory Area under provisions of BLM's Final Wilderness Inventory and Study Procedures Handbook, approximately 5,885 acres (80% of the Reserve), would be managed as a WSA (figure 5-3). This alternative would preclude forest restoration actions throughout the designated area, and would preclude bicycle use on the Salmon Creek Trail (Alternative 5A).

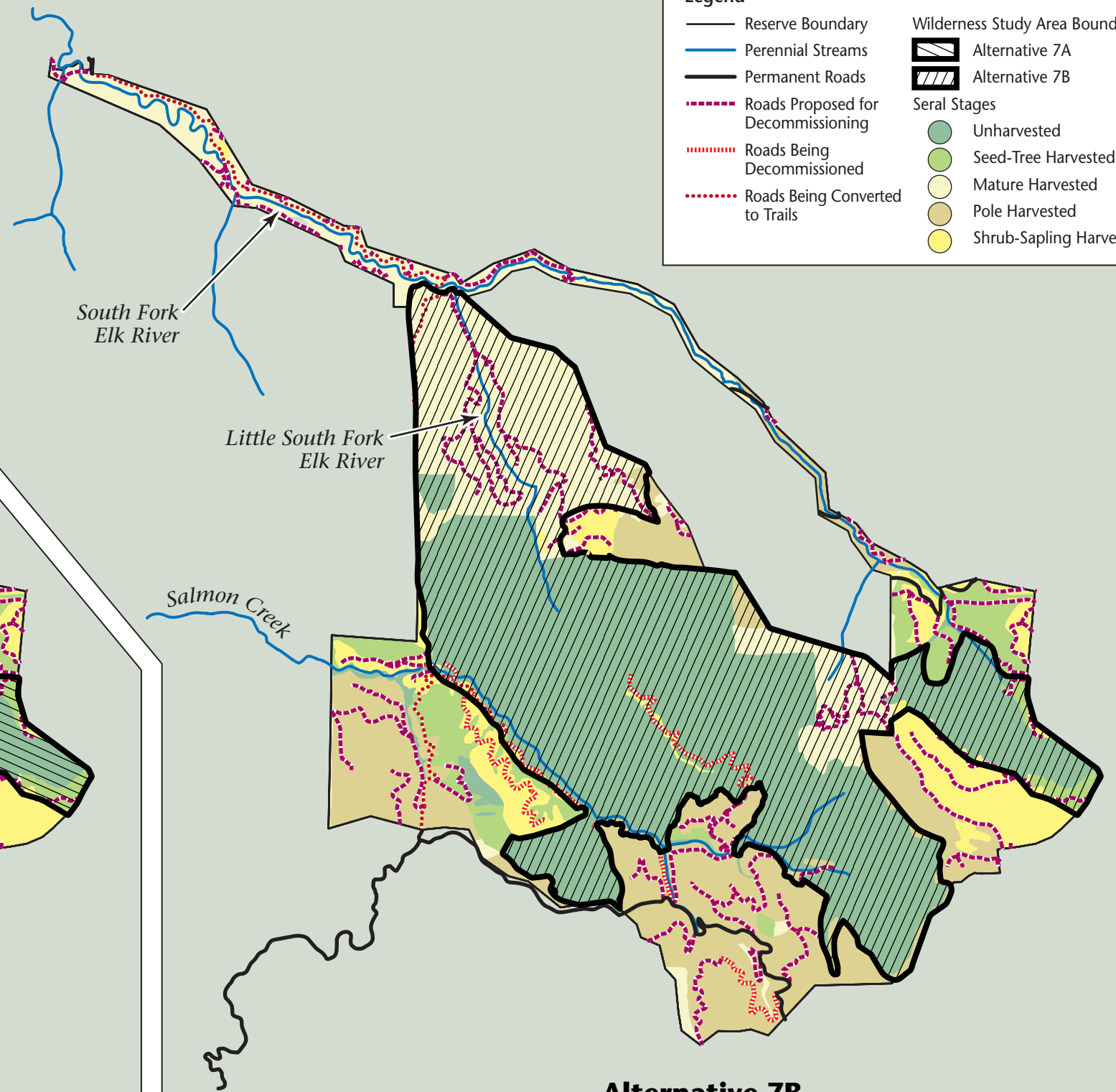
Alternative 7B: Exclude Younger Harvested Stands from WSA Designation (Preferred)

The old-growth groves, other undisturbed forests, and older harvested stands in early-mature or later successional seral stages, approximately 4,400 acres (60% of the Reserve), would be

Figure 5-3
Wilderness Study Area Alternatives
in the Headwaters Forest Reserve



Alternative 7A



Alternative 7B

Legend

- | | |
|--|--------------------------------|
| — Reserve Boundary | Wilderness Study Area Boundary |
| — Perennial Streams | Alternative 7A |
| — Permanent Roads | Alternative 7B |
| - - - Roads Proposed for Decommissioning | Seral Stages |
| - . - . Roads Being Decommissioned | Unharvested |
| - . . . Roads Being Converted to Trails | Seed-Tree Harvested |
| | Mature Harvested |
| | Pole Harvested |
| | Shrub-Sapling Harvested |

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0 2000 4000 6000 ft

Scale = 1:54,000 (1 in = 4500 ft)

managed as a WSA (figure 5-3). This alternative would allow any of the forest restoration and recreation access alternatives to be implemented.

Alternative 7C: No WSA Designation (No Action)

No portion (0%) of the Reserve would be managed as a WSA.

National Wild and Scenic Rivers

Issue

Should eligible streams on the Reserve be recommended for inclusion in the National Wild and Scenic Rivers?

Alternative 8A: All Eligible Streams Recommended for Wild and Scenic River Designation

All streams on the Reserve that meet eligibility requirements for consideration for Wild and Scenic River designation—Salmon Creek, South Fork Elk River, and Little South Fork Elk River—would be suitable for inclusion in the National Wild and Scenic Rivers System. This alternative would not impose any additional management requirements on these lands to protect Wild and Scenic values.

Alternative 8B: No Stream Recommended for Wild and Scenic River Designation (No Action; Preferred)

None of the streams on the Reserve would be recommended for inclusion in the National Wild and Scenic Rivers System.

State of California Ecological Reserve

Issue

Should the Reserve be recommended to the California Fish and Game Commission for designation as an Ecological Reserve under provisions of Title 14 Section 630 of the California Fish and Game Code?

Alternative 9A: Ecological Reserve Designation Recommended (Preferred)

Unless specifically allowed by the state designation action, designation would have the effect of precluding possession of firearms (including bows), camping, fires, swimming, and operation of aircraft or hovercraft in the Reserve, in addition to other management requirements that are already part of the proposed management direction of this plan.

Alternative 9B: No Ecological Reserve Designation Recommended (No Action)

The Reserve would not be recommended for Ecological Reserve designation.

Alternatives for Management Revenue

User Fees (or In-Lieu Donations)

Issue

Should access fees (or in-lieu labor donation) be charged to users of the Reserve?

Alternative 10A: Universal User Fee

All users of the Reserve would be charged a daily user fee (or would donate labor).

Alternative 10B: BLM-Sponsored Tour User Fee (Preferred)

Reserve visitors participating in guided hikes would be charged a fee.

Alternative 10C: Non-Tour User Fee

All users of the Reserve, except participants in guided hikes, would be charged a daily user fee.

Alternative 10D: No Fees (No Action)

Fees would not be assessed for entry into the Reserve.

Chapter 6. Environmental Consequences (Environmental Effects and Alternative Comparisons)



Chapter 6. Environmental Consequences (Environmental Effects and Alternative Comparisons)



Introduction

This chapter addresses the environmental consequences (or effects) of implementing the proposed management direction (chapter 4) of all alternatives (chapter 5). Where impacts were identified that require mitigation, the mitigation measures have been incorporated into chapter 4. The management plan is configured to maximize benefits and minimize adverse effects on both ecosystem function and the human environment. Nevertheless, some unavoidable adverse effects would result from some of the proposed or alternative actions. For example, some of the actions proposed would have some short-term adverse effects. However, when judging the significance of short-term impacts, expected long-term benefits on ecosystem health must be considered. For example, because of the limited portion of each watershed that is treated annually, a first-year increase in sediment yield from proposed road decommissioning projects, followed by a permanent, long-term major reduction in sediment yield, would not be considered a significant adverse effect. On the other hand, adverse effects that would be of a repetitive nature in perpetuity, such as human degradation of critical habitat for threatened or endangered species caused by trail construction and backcountry hiking, may be considered significant adverse effects.

Adverse effects may include direct impacts, indirect impacts, or cumulative impacts. In each section below, the foreseeable impacts of these three types are addressed together as needed. For the proposed actions, cumulative effects on ecosystem function are all beneficial, obviating the need for a specific discussion of cumulative effects. For some of the alternatives, however, significant direct, indirect, or cumulative effects on ecosystem function may occur.

As noted, the significance of direct, indirect, or cumulative adverse effects is determined by weighing together both short-term and long-term effects. Criteria and reasoning for determining significance are described within the significance discussions of each potential impact (rather than being set forth separately beforehand).

As noted in chapter 1, the baseline for measuring impacts is the current condition of the Reserve under the interim management policy, which is described in chapter 3. Thus, the impact of a proposed action on either ecosystem function or the human environment that involves continuation of interim management would be considered in this assessment to have no net effect, either beneficial or adverse. The selected baseline is required both by CEQA and by ESA and CESA and can be employed under provisions of NEPA if it is considered a reasonable and appropriate baseline.

Effects Summary

Implementation of the proposed plan would result in substantial beneficial changes to the Reserve's ecosystems and to the public's ability to experience them. Implementation of some of the alternatives would have significant adverse effects on the Reserve's ecosystems, and even though they may benefit some user groups, these alternatives would not be introduced into the Reserve. Benefits and adverse effects of each program element on the various resources are summarized in table 6-1.

Species Management

As discussed in chapter 4, restoration of ecosystem processes and function and preservation of old-growth and riparian dependent species are the cornerstones of Reserve management. Species management is actually carried out, however, by actions under the other major program areas. The purpose of actions such as watershed and forest restoration is to directly benefit ecosystem processes and function; actions such as closing portions of the Reserve to visitors on a seasonal and hourly basis are meant to avoid adversely affecting ecosystem processes and function. Accordingly, specific impacts on ecosystem and species processes are discussed under each of the various other program elements below. In this section, only the general effects on ecosystem and species integrity are addressed.

Under all alternatives, vegetation at the Reserve will advance to later successional stages. Because of past timber harvesting, less than half of the Reserve presently provides old-growth habitat. Harvested lands include some mature seral stages, but large acreages of both shrub-sapling habitat and pole habitat are present. Moreover, an extensive system of logging roads traverses these harvested lands, which are populated by plant and animal species that prefer more open habitats compared to old-growth forest habitat. Thus, habitat for species associated with young forests, forest openings, and disturbed areas will diminish through time under all alternatives. Correspondingly, habitat for old-growth-dependent species will increase through time under all alternatives. This effect would happen more quickly under Alternatives 1A or 1B and 2A or 2B than under the no-action restoration alternatives (1C and 2C).

Table 6-1. Summary of Environmental Consequences

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Species Management					
Special-status species	Increased amount and continuity of habitat	None because seasonal closures required	Restoration alternatives accelerate habitat recovery	Extensive trail system alternatives or unescorted hiking risks species disturbance	None
Other species	Increased extent of old-growth habitat for late-successional and old-growth-dependent species	Decreased extent of early-successional habitat	Restoration alternatives accelerate old-growth habitat recovery	Restoration alternatives accelerate loss of early-successional habitat	None
Recreation access	Continued public access	Seasonal and hourly exclusions from portions of Reserve	No change in closures from existing management	No change in closures from existing management	None
Watershed Restoration					
Water quality and aquatic species	Long-term decreases in surface sediment yield and stream sedimentation	Temporary exposure of soils to surface erosion	By removing road prisms, more intensive restoration provides correspondingly greater benefit to mass stability	More intensive restoration slightly increases near-term potential for soil erosion	None
Forest structure and old-growth characteristics	5% increase in old-growth habitat	None	Action alternatives accelerate recovery of old-growth habitat	Removal of existing vegetation under action alternatives	None
Special-status plants	Increased habitat for likely special-status species	Small potential for disturbance to existing populations	Action alternatives accelerate expansion of habitat	Transplanting of any discovered populations may be required under action alternatives	None

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Invasive nonnative plants and animals	Decreasing opportunity for invasive nonnative plant establishment	None	Action alternatives accelerate decreasing opportunity	Action alternative may increase probability of controllable infestation	None
Common wildlife	Increased amount of habitat for species dependent on old-growth forest riparian habitat	Disturb or harm species adapted to shrub, pole, and edge habitats, occurring at stream crossings, and using roads for movement	More intensive restoration alternatives accelerate development of desirable habitat	More intensive restoration alternatives tend to increase disturbance effects, which may be mitigated. Some residual short-term adverse impacts by mortality of a few individuals	None
Spotted owl and marbled murrelet	Reduction in edge habitat that favors corvid intrusion	On most areas potential for noise disturbance avoided by imposed seasonal closures of operating periods	More intensive restoration alternatives accelerate development of desirable habitat	Potential for noise disturbance avoided by imposed seasonal closures of operating periods	None
Other special-status wildlife	No effect or increase in required habitat	Potential for direct short-term impacts on small, relatively immobile ground dwelling species over a small acreage of the Reserve	More intensive restoration alternatives accelerate development of desirable habitat	Potential for direct disturbance; or mortality of a few individuals over a small area	None
Fire suppression	None	None	—	--	None
Recreation access	Provides opportunity for resource interpretation	Temporary trail closures	More intensive alternatives provide more opportunities	More intensive alternatives entail more temporary closures	None
Cultural Resources	None	None	None	Mitigable potential for disturbance to undiscovered resources	None

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Forest Restoration					
Forest structure and old-growth characteristics	Action alternatives significantly accelerate recovery of old-growth characteristics	Action alternatives result in mitigatable increase in windthrow in managed stands	More intensive alternative provides benefit more effectively over much larger area	Less intensive alternative may induce greater windthrow and slash disposal; no action increases disease, insect infestation, and fuel build up	2C
Special-status plants	Increased habitat for likely special-status species	Small potential for disturbance to existing populations	Action alternatives accelerate expansion of habitat	Avoidance of discovered populations may be required under the action alternatives	None
Invasive non-native plants and animals	Decreased habitat and individuals over the long term	None	More intensive alternative accelerates benefit more rapidly	Under action alternatives, adjustment of thinning prescriptions and direct removal of invasives may be required	None
Water quality and aquatic species	Long-term improvement in runoff timing, quality, and temperature	On most areas temporary increase in precipitation energy at the forest floor	More intensive alternative accelerates benefit; no action involves long time period for benefit to materialize	Proposed slash disposal mitigates short-term impact; no action allows significant increases in risk of stand-replacing fire (RSRF) and associated risk of degraded runoff conditions	2C

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Common wildlife	Accelerated recovery of habitat for old-growth-dependent species	Disturb or harm species dependent on shrub and early-successional forest habitat	More intensive alternative accelerates benefit; no action involves long time period for benefit to materialize	More intensive restoration alternative increases potential disturbance effects, which can be mitigated	None
Marbled murrelet and spotted owl	Increase in suitable habitat for these species	Potential for noise disturbance avoided by imposed seasonal operating periods	More intensive restoration alternatives accelerate development of desirable habitat	Potential for noise disturbance avoided by imposed seasonal closures of operating periods	None
Other special-status wildlife	Accelerated recovery of habitat for old-growth-dependent species	Potential for direct disturbance	More intensive restoration alternatives accelerate development of desirable habitat	Potential for direct disturbance; avoided by preactivity survey and avoidance action	None
Fire behavior and fire management	Action alternatives reduce RSRF over the mid- and long-term	Temporary increase in ground fuels, which will be mitigated by proper slash disposal	Alternative 2A addresses the highest risk pole stands; no action allows existing RSRF to increase in mid-term	Alternative 2A maximizes temporary ground fuels but is mitigatable	2C
Recreation activities	Action alternatives enhance old-growth ecosystem—the focus of the recreation program	Action alternatives cause temporary emissions of noise, fumes, dust, and smoke and require temporary trail closures	Alternative 2A provides greatest benefit	Alternative 2A causes greater emissions and closures and cause greater visual change	None
Cultural Resources	None	None	None	Mitigable potential for disturbance to undiscovered resources	None

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Research Management					
Research activities	Both pure and applied research will be conducted	None	NA	NA	None
Biological resources	Improved understanding of ecosystem functions and processes	Potential to disturb ecosystem functions and processes; avoided by proposal modifications	NA	NA	None
Resource monitoring	Potential contribution to monitoring data needed for plan implementation	None	NA	NA	None
Fire Suppression					
Fire frequency and behavior	Little or no effect	Little or no effect on relatively fire-independent ecosystem	NA	NA	None
Biological resources	Preservation of the Reserve’s resources	Habitat losses caused by fire line construction, subject to rehabilitation; noise disturbance to nesting birds during suppression; incidents infrequent	NA	NA	None
Research	Preserve subject of research	Slight diminishing of natural baseline conditions represented by the Reserve	NA	NA	None
Recreation access	Preserve public values	NA	NA	NA	None
Visual Resource Management					

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Visual quality	Gradual improvement of visual quality	Short-term degradation	NA	NA	None
Recreation Access Management					
Visitors experiences	Good recreation experiences focused on the Elk River corridor	None	Varying degrees of opportunity to experience old-growth ecosystems	Use of southern access for only BLM tours limits individual exploration; closure of southern access eliminates potential old-growth experience otherwise provided by 4A and 4B for the elderly and disabled	4C
			Biking alternatives expand mountain biking opportunities in the region	Biking interferes with contemplative recreation focus of the Reserve, poses threat to walker/hiker safety	5A, 5B
			Equestrian alternatives expand horseback riding opportunities in the region	Horse excrement and trail degradation are annoying to other users; equestrian use requires more-than-minimal facilities, which conflicts with legislative direction	6A, 6B
Special-status plants	None	Losses of populations avoided by prohibition of off-trail hiking and collecting	NA	NA	

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Invasive nonnative species	None	None	None	Wider trails to accommodate bicycles or equestrians increase opportunities for infestation; horse entry may provide sources of infestation	None (reconsider in 5 years)
Aquatic ecosystems	Increased public stewardship resulting from tours and other outreach	Streambank erosion along Elk River	None	Unescorted southern access or an extensive trail system increase soil erosion, direct disturbance to fish, bicycle or equestrian use beyond the Elk River corridor increases soil erosion and stream sedimentation	3A, 4A, 5A, 6A
Common wildlife	Increased public stewardship resulting from tours and other outreach	Direct habitat loss from any new trails; noise disturbance and species changes along all trails; dog disturbances in Elk River corridor	No-southern-access alternatives eliminate human intrusion over large areas of both old-growth and second-growth habitat	Unescorted southern access or an extensive trail system increases illegal off-trail hiking, system alternatives would results in from 1.9% to 13.4% of Reserve being subject to human disturbance effects, compared to 4.9% existing	3A, 4A
Marbled murrelet and spotted owl	Increased public stewardship resulting from tours and other outreach	Increasing potential for corvid expansion and Marbled murrelet disturbance in Elk River corridor	No-southern-access alternatives substantially reduce potential for nesting disturbance	Unescorted southern access or an extensive trail system increases off-trail hiking, discarding of food wastes that attract corvids	3A, 4A

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Other special-status wildlife	Increased public stewardship resulting from tours and other outreach	Direct habitat loss from any new trails; noise disturbance and species changes along all trails	No-southern-access alternatives eliminate potential disturbance effects	Unescorted southern access or an extensive trail system increases off trail hiking. See also trail-use disturbance area percentages above	3A, 4A
Cultural Resources	Commitment of financial resources to extracting resource values and fostering public support for protection, evaluation, and interpretation	Mitigable potential for disturbance to undiscovered resources from various improvements	Use of the historic military ridge trail may enhance its preservation	<p>1. Alternatives expanding trail system tend to increase mitigable potential for disturbance to undiscovered resources</p> <p>2. Alternatives expanding public access tend to increase potential for resource disturbance, which is generally mitigable. However, public use of the historic military ridge trail may result in uncontrollable damage to an adjacent prehistoric site.</p>	Alternative 4A

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Socioeconomic effects	Slight economic stimulus to Eureka	Traffic annoyance to residents of Elk River Road	Extensive and limited trail alternatives and unescorted southern access alternative provide slight economic stimulus to Fortuna; no-southern-access alternatives would eliminate traffic annoyances to residents of Newburg Road	Extensive and limited trail alternatives increase traffic annoyances to residents of Elk River Road, and these trail alternatives and the unescorted southern access alternative increase traffic annoyances to residents of Newburg Road; introduction of equestrian use further increases traffic annoyances to residents of Elk River Road	6A, 6B
Fire behavior and management	None	Fire ignition risk caused by human entry	No-southern-access alternatives eliminates human fire ignition risk over large portion of Reserve	Extensive and limited trail system alternatives allow human contact with most flammable second-growth stand	4A and 4B, unless 2A or 2B selected
Resource monitoring	None	None	None	None	None
Management of Designated Special Areas					
Wilderness Study Area	Preserves wilderness values in area currently meeting wilderness criteria	Disallows forest restoration and bicycle use	Area designated varies from 80% to 60% to none of the Reserve	Most extensive designation significantly reduces extent of both forest restoration alternatives and disallows bicycle use option on Salmon Creek Trail. Preserves and protects outstandingly remarkable values	7A, 7B

Table 6-1. Continued

Program and Resource Affected	Effects of Direction Common to the Alternatives		Relative Effects of the Alternatives		Alternatives Resulting in Unavoidable Significant Adverse Effects
	Benefits	Adverse Effects	Benefits	Adverse Effects	
Wild and Scenic River	NA	NA	None	None	None
State ecological reserve	NA	NA	Provides authority to ban firearms and campfires from the Reserve and prevent hovercraft/aircraft from affecting nesting murrelets and owls	Precludes wading/ swimming in South Fork Elk River and use of aircraft for fire suppression or logging of adjacent timberland, unless specifically allowed in the designation	None
Resource Monitoring and Evaluation					
Ecological resources	Informs management of Reserve's resources	None	NA	NA	None
Recreation access	Informs management of visitation	None	NA	NA	None
Use Fees					
Recreation access	None	None	None	None	None

Effects of Species Management on Special-Status Species

All of the special-status plant and animal species known to occur in the Reserve prefer or require late-successional and old-growth forest habitat. Of all potential special-status species that could occur on the Reserve, none prefer brushlands or early-successional forest. Under all alternatives, old-growth habitat will gradually increase in extent from the current 42% of the Reserve to nearly 100%, over the long term. In general, the proposed management and all alternatives will tend to result in net benefits to special-status species over time. This expected effect could be reduced, however, by increased levels of human access under some alternatives that could degrade both terrestrial and aquatic habitats. For example, closures required to avoid disturbance to nesting spotted owls and marbled murrelets may be effective in preventing direct impacts, but, under some alternatives, closure enforcement would be difficult or indirect adverse effects may be induced (i.e., those alternatives that diminish control of [prohibited] off-trail hiking or induce colonization of the Reserve by corvids). Under access Alternatives 3A and 4A, in particular, adverse habitat effects may offset gains in habitat extent, resulting in a significant adverse effect on special-status species that inhabit the Reserve.

Effects of Species Management on Common Species

Under all alternatives, and especially under the restoration alternatives, populations of species associated with open habitats would tend to diminish through time. Because most of these species are common, the direct effect is less than significant. In addition, because such early-successional habitats are widespread throughout adjoining timberlands, the potential adverse cumulative effect is also considered less than significant.

Effects of Species Management on Recreation

Public visitation and interpretation is a beneficial component of all management alternatives. However, hourly closures of portions of the Reserve to minimize disturbance of murrelet and spotted owl nesting are imposed under current management and would be imposed under all alternatives. These closures cause some reduction in the availability of the Reserve for human use, though the effect on total visitation and opportunities foregone is considered very small. Because no change in management would occur, no consequences will result.

Watershed Restoration

Effects of Watershed Restoration on Water Quality and Aquatic Species

Effects of Management Common to All Watershed Restoration Alternatives

Benefits

Under all three watershed restoration alternatives, sediment input to the Reserve's streams will be reduced by

- stabilizing roads, skid trails, and log landings;
- fully excavating stream crossings; and
- stabilizing slopes that have been subject to landslides.

Furthermore, emergency sediment reduction actions will prevent catastrophic inputs of sediments into streams. These efforts to restore natural hydrologic and sediment processes within disturbed watersheds will result in the improved quality of these aquatic habitats, as described below.

Revegetation and road stabilization in watersheds adversely affected by timber harvest and related activities have been shown to substantially reduce surface and landslide erosion. This reduction in erosion leads to improvements in downstream fish habitat because of the corresponding reduction in sediment yield to watercourses (Reeves et al. 1991). As sediment input to the streams is reduced, the amount of available energy in the stream to mobilize the accumulated sediment will gradually increase, resulting in pool scouring and the flushing of existing fine sediments from stream gravels. These changes will improve conditions for anadromous fish spawning and rearing.

Stream sediment, whether settled or suspended, can damage aquatic habitats and reduce fish production, growth, and survival. Fine sediments deposited in gravels can lower spawning success (by reducing egg survival and trapping emerging fry) or reduce the availability of food in streams (by limiting primary production and invertebrate abundance). Fine sediment that remains in suspension increases turbidity, which can increase fish mortality, reduce feeding opportunities for sight-feeding fish (including salmonids), and lower fish production by causing fish to avoid biologically important habitat or delay migration to upstream spawning habitats.

Coarse sediment can alter channel beds, channel geometry, and bank erosion rates. Stream reaches that become aggraded (i.e., accumulate bed materials) with coarse sediments typically become wider and shallower, with more riffle habitat area and less pool habitat area, volume, and depth (Hicks et al. 1991). Steelhead and coho salmon abundance correlate positively with pool habitat area, volume, and depth.

Potential Adverse Effects

The use of heavy equipment for watershed restoration has the potential to cause stream contamination from accidental spills of fuel, lubricant, or oil. These spills can occur during equipment operation, maintenance, or refueling. Implementation guidelines for watershed restoration in chapter 4 are expected to make the probability of such an event highly unlikely; therefore, the adverse effect would be less than significant.

During rainy periods after restoration actions are taken, the potential will exist for newly disturbed soils to erode and contribute sediment to streams. Such erosion would be considerably less than that presently occurring (Madej 2001). The potential will primarily exist until disturbed soils become revegetated (Madej 2001), generally about two years following disturbance in the Reserve's wet, warm climate. In the interim, the lopping and scattering of removed vegetation and rice straw as mulch over the disturbed soils surfaces will provide partial protection for exposed soils.

At removed stream crossings, some sediment input to streams or ephemeral runoff will generally occur as the channel morphology undergoes some natural adjustment. Because the original

stream profile is reestablished, the magnitude of the adjustment will be relatively small and rapid. Moreover, the areas of disturbed channel are relatively small.

Implementation guidelines described in chapter 4 will limit watershed restoration activities to nonrainy periods when less-sensitive fish life stages are present, and the likelihood of introducing sediments to waterways is at a minimum. These guidelines and other implementation guidelines will assure that the potential short-term effect of increased stream sedimentation immediately following restoration will be less than significant.

Relative Effects of the Watershed Restoration Alternatives

Benefits

The benefit of road restoration is improved aquatic habitat conditions resulting from enhanced watershed stability. Watershed stability is most directly related to the volume of earth relocated during restoration. Under Alternative 1A (full-recontour watershed restoration), twice as much earth would be moved as under Alternative 1B (hydrologic-stabilization watershed restoration) (1.2 versus 0.6 million cubic yards)(table 4-1). Under Alternative 1C, restoration would cease at only 0.2 million cubic yards.

In addition to earthwork volume, final configuration, risk of instability, and aesthetics are key variations among alternatives. The primary benefits of full recontouring (Alternative 1A) are reestablishment of natural surface flow and eliminating interception of surface drainage. This in turn enhances stability and aesthetic value. Even though Alternative 1B entails hydrologic stabilization and enhanced stability, the risk of and, consequently, the long-term frequency of slope failures are higher under Alternative 1B because existing road prisms are largely retained. Over the long term, slope failures under Alternative 1B may require additional access and treatment operations or could result in additional sedimentation. Therefore, considering both volume and stability, the three alternatives would provide differing levels of benefit to downstream aquatic habitats. These benefits come at similarly varying costs (table 4-8). Full recontouring (Alternative 1A) is presently the primary approach used by the California Department of Parks and Recreation, and by the Redwood National Park for the redwood parks in the north coast region, primarily because parklands should not continue to contain roads used for timber management and because repeated entry is costly.

Potential Adverse Effects

The potential adverse effects of watershed restoration are directly related to the area of soil disturbed under a particular alternative. Under Alternative 1A (full recontouring) and Alternative 1B (hydrologic stabilization), the extent of treated roads, stream crossings, landings, and landslides would be about the same. Under Alternative 1A, the portion of the watershed disturbed by watershed restoration would be 5.2%, whereas under Alternative 1B, because the average width of restoration is less, it would be 4.6% (table 6-2). By exposing an additional 43 acres of land (an additional 13% of disturbed acreage) at a rate of perhaps 10 acres more per year, finished soil surfaces under Alternative 1A would be slightly more susceptible to surface erosion than under Alternative 1B. Under Alternative 1C, about one-third as much soil would be exposed.

Under all alternatives, mulch would be applied to the disturbed surfaces, and other implementation guidelines given in chapter 4 would be employed. Soil erosion at road

restoration sites in the north coast region employing similar approaches has not generally been a significant problem (Casaday pers. comm.). Natural regeneration rapidly provides ground cover in the warm, wet climate, and revegetation maintenance is focused on thinning rather than stimulating growth. A very intense rainfall on a recently disturbed site is always a potential occurrence. However, considering the Reserve's watersheds as a whole, the potential for significant erosion of soils disturbed by watershed restoration under each of the alternatives is small. Accordingly, the potential adverse effect on aquatic habitats caused by watershed restoration under all alternatives is considered less than significant.

Effects of Watershed Restoration on Forest Structure and Old-Growth Characteristics

All watershed restoration action alternatives would eventually result in an approximate 5% increase (341–384 acres) in the extent of old-growth habitat relative to current conditions (table 6-2). Under the no-action alternative (1C), natural development of old growth would be slowed by periodic slope failures along the extensive system of abandoned logging roads in the Reserve. Under the action alternatives (1A, 1B), existing vegetation that has already colonized abandoned roads and landings would be removed and used for mulch, but tree species would be planted or would rapidly colonize the stable sites. Because of ripping or filling of stabilized road surfaces, the increase in old-growth forest would be substantially accelerated. The effect would be similar between the two action alternatives.

Table 6-2. Extent of Watershed Restoration

Watershed	Condition	Area to be Disturbed ^a (acres)	Watershed Area (acres)	Percent of Watershed Area ^a
Upper Little South Fork Elk River	Nearly all unharvested (northern portion of central grove)	12–15	1,500	0.8–1.0
Salmon Creek	Both unharvested (southern portion of central grove) and harvested	181–201	3,000	6.0–6.7
Upper South Fork Elk River	Both unharvested (eastern grove) and harvested	77–89	1,300	5.9–6.8
Lower Little South Fork Elk River	All harvested	71–79	1200	5.9–6.6
Elk River Corridors	Harvested and riparian	<u>0</u>	<u>400</u>	<u>0</u>
Entire Reserve	--	341–384	7,400	4.6–5.2

Note: The distribution of watershed restoration can be seen on figure 4-2. Restoration will include reforestation (planting and thinning disturbed restoration sites).

^a Range is from Alternative 1B - Hydrologic Stabilization to Alternative 1A - Full Recontour.

Effects of Watershed Restoration on Special-Status Plants

Special-Status Vascular Plant Species

As noted in chapter 3, no field surveys have been conducted to identify special-status plants in the Reserve. During other survey work in the Reserve, a single population of heart-leaved twayblade, a CNPS list four species, was observed (Wheeler pers. comm.).

Restoration involves previously disturbed environments, which have a low probability of supporting special-status plant populations in this region. If special-status species are believed to be present, avoidance measures will be implemented if technically feasible. If measures are not technically feasible, populations will be transplanted to suitable habitats under the direction of a qualified botanist. With these measures available, the potential direct adverse effect of watershed restoration on special-status plant species, should any be present, will be less than significant.

If populations of special-status plants are present in wetlands, wet meadows, or riparian areas downstream from restoration sites, the restoration projects may indirectly result in a benefit to these species by reducing the probability of sedimentation or scouring of these populations.

As vegetation naturally established on abandoned roads or planted on decommissioned or removed road surfaces trends toward later-successional forest stages and as stream channels downstream become more stable over time, the habitats gained under all alternatives will be more likely to support special-status species than the habitat that was lost. Roaded and logged forest lands suffering stream sedimentation are widespread in the region, but unroaded, unharvested old growth is of limited extent. This ratio of roaded to unroaded land will contribute to threatened and listed species favoring undisturbed, later-successional forest stages. Thus, under all alternatives, watershed restoration will in general benefit special-status plant species that may occur in the Reserve. Alternatives 1A and 1B would stabilize much more roadway substrate than would Alternative 1C, thereby resulting in a relatively faster rate of development of suitable habitat for special-status plant species.

Survey-and-Manage Cryptogam Species

Survey-and-Manage cryptogam species in the Reserve include fungi and lichens and may include bryophyte species. These species are generally associated with old-growth forest types and have a low potential to occur in previously disturbed areas proposed for watershed restoration action. Watershed restoration action would therefore be very unlikely to directly adversely affect Survey-and-Manage cryptogams. Over the long term, watershed restoration will accelerate recovery of old-growth habitats and downstream riparian habitats that are needed by the Survey-and-Manage cryptogam species.

Effects of Watershed Restoration on Invasive Nonnative Plants

Watershed restoration actions will require the removal of existing vegetation and the exposure of soils along abandoned roads, landings, and skid trails. Such changes have the potential to create conditions favorable for establishment of invasive nonnative plants. However, use of implementation guidelines in chapter 4 (under “Species Management—Invasive Nonnative Plants” and “Recreation Management”) will likely prevent weed propagation, dispersal, and establishment in the restoration sites. If plants do colonize a site, they can be removed as a part

of normal weeding during the revegetation maintenance period. The potential adverse effect is therefore less than significant. Over the long term, watershed restoration is expected to result in a beneficial effect by promoting reestablishment of stable natural forest vegetation, which excludes invasive, nonnative plants.

Effects of Watershed Restoration on Wildlife

Effects of Management Common to All Watershed Restoration Activities

Long-term benefits of watershed restoration on wildlife resources will be enhancement of downstream and downslope riparian habitats, recolonization of native forest vegetation along former logging roads, and reduction in forest fragmentation caused by these roads.

Restoration actions can result in temporary disturbance to roadbed and roadbed edge habitat for common species and noise disturbance to breeding birds. However, breeding-period closures and other implementation measures described in chapter 4 will minimize breeding disturbance to species identified as threatened, endangered, candidate, sensitive, or otherwise of special status.

In the following sections, effects on various wildlife species or groups are described.

Common Wildlife

The primary long-term effect of watershed restoration on common wildlife will be an overall increase in quality habitat for species that depend on old-growth forests habitat and, specifically, wildlife species that depend on stable aquatic habitats for meeting all or part of their biological needs. Common amphibians and mollusks (refer to Chapter 3 for a list of common wildlife) are the species that will benefit the most from the proposed watershed restoration activities.

Alteration of roadbeds, landings, and skid trails and removal of stream crossings might temporarily disturb wildlife species that are adapted to shrub habitats, using these roads as dispersal corridors, or inhabiting the stream crossings. Temporary and isolated disturbance to this small quantity of habitat is considered less than significant because it will not result in a substantial reduction in local populations of common wildlife species.

A short-term impact that could result from the project is the potential for noise disturbance from restoration activities to interrupt normal breeding behavior in common birds. Limited operating periods established for federally listed birds and mitigation measures established for migratory birds (discussed below) will prevent noise disturbance to breeding common birds.

Migratory Birds

As with common wildlife species, the long-term indirect effect of watershed restoration will be the reduction in the amount of suitable habitat for migratory bird species adapted to edges and disturbed areas, such as American robins and dark-eyed juncos. Because these species are considered locally and regionally abundant and widely distributed, reducing the amount of available, suitable habitat is not expected to reduce or eliminate populations.

Very little direct impact on breeding migratory birds would be expected to occur as a result of watershed restoration activities. Approximately 60% of the watershed restoration activity would be restricted to limited operating periods established for nesting marbled murrelets and northern spotted owls (figures 3-6 and 3-7). Adverse impacts on a limited area may occur on an infrequent basis.

Marbled Murrelet and Northern Spotted Owl

Removal of roadbeds will benefit marbled murrelet and northern spotted owl. As discussed in chapter 3, corvids, which require edge habitats, are efficient nest predators that pose a threat to the survival of the marbled murrelet. Watershed restoration will accelerate the reduction in edge habitats and help reduce or preclude corvid intrusion.

No direct removal of suitable marbled murrelet or northern spotted owl habitat would occur during watershed restoration activities. Noise disturbance from restoration activities, however, has the potential to interrupt normal breeding behavior of the marbled murrelet and northern spotted owl. Watershed restoration actions that may cause visual or auditory disturbances that are not adequately dampened by vegetative or topographic screening will be restricted by distance buffers of up to 0.25 mile from occupied or suitable habitat of marbled murrelets or northern spotted owls. If buffers cannot be used effectively, limited operating periods will be imposed (September 15–March 23 for murrelet habitat and July 31–January 31 for northern spotted owls).

In some instances, the situation may require a limited amount of incidental take, by disturbance; this will be dealt with on a case-by-case basis through consultation.

Bald Eagle and Osprey

Bald eagle or osprey habitat will not be significantly enhanced by restoration action. The increasing fish populations on the Reserve are in habitats that are largely unsuitable for these species' feeding.

Bald eagle or osprey nesting or roosting habitat will not be affected by the proposed restoration activities. Because eagles have not been using the Reserve for nesting and are mobile, the potential for noise to disturb the species is minor. If, however, a bald eagle or osprey nest were located in the Reserve before restoration activities were begun or completed, appropriate avoidance measures would be implemented until the young had fledged.

Amphibians and Reptiles

Restoration of aquatic ecosystems will benefit species that depend on the aquatic or riparian environments for all or part of their biological needs. Long-term beneficial effects on amphibians and reptiles from watershed restoration activities include

- reducing sediment in streams,
- maintaining cooler water temperatures, and
- enhancing riparian vegetation.

Species such as torrent salamanders and tailed frogs are sensitive to increased water temperature and sedimentation. Removal of stream crossings and reduction of sediment yield in streams will increase available suitable habitat for these and other amphibians in the Reserve.

Restoration activities in or adjacent to riparian and aquatic habitats that support these species have the potential to disturb or harm individual animals. However, avoidance measures (chapter 4) will reduce this impact.

Survey-and-Manage Wildlife Species

Enhancement of old-growth habitat and maintenance of a canopy cover near riparian areas will benefit the Del Norte salamander. Because of improved stability over time, restoration activities will produce a moister microclimate through an increase in canopy closure, enlarging the extent of suitable habitat for this species.

Roadbed decommissioning will generally not affect suitable habitat for the Del Norte salamander; however, if rocky areas are to be disturbed, a small, isolated, and unquantified number of individuals may be taken.

Relative Effects of the Watershed Restoration Alternatives

Under Alternatives 1A and 1B, roads and landings having significant sediment yield would be fully recontoured and revegetated, and stream crossings would be restored. Long-term benefits under these alternatives would consist of enhanced stability of riparian and aquatic habitats, benefiting especially those species that depend on late-successional forest. Moreover, the alteration of existing roads would accelerate the reduction in edge habitat for nest predators, benefiting both common and special-status bird species.

Under Alternative 1C, watershed restoration would not extend beyond the Year 2002. As a result, approximately two-thirds of the prerestoration sediment yield would continue to degrade riparian and aquatic communities and diminish their wildlife resources. Edge habitat created by the road system would diminish, but it would diminish slowly over two-thirds of the road system.

The alternatives vary in the amount of terrestrial habitat that must be modified to implement watershed restoration. Alternative 1A would affect modification of 384 acres, compared to 341 acres for Alternative 1B2 (13% less). Alternative 1C would not extend watershed restoration activities beyond the Year 2002. As a result, only about two-thirds of the roadway habitats would be modified, and habitat intrusion by mechanized equipment would extend over half as many years.

Under even the more intensive alternatives (1A and 1B), temporary and isolated disturbance of the small quantities of early-successional habitat (approximately 40–60 acres per year) would not be expected to reduce the number or range of any common or special-status species. The habitat affected is a very common habitat on lands surrounding the Reserve. Disturbance to both common and special-status nesting birds would be avoided by limiting operating periods and implementing other species management and watershed restoration implementation guidelines (chapter 4). Based on the type of habitat affected and the avoidance measures adopted, short-term habitat and wildlife disturbance impacts under all alternatives are considered less than significant.

Effects of Watershed Restoration on Fire Suppression

Roads to be removed or stabilized on the Reserve are, in general, not available for use by vehicles and therefore would play only a minor role in any fire suppression incident at the Reserve. A network of defensible roads used for timber management in the area will continue to provide access into and around the Reserve. Effects of watershed restoration under all alternatives would have a less-than-significant effect on the nature of fire suppression proposed for the Reserve (chapter 4).

Effects of Watershed Restoration on Recreation Activities

One benefit of watershed restoration will be the opportunity to provide recreation services to the public. Watershed restoration is of interest to the public, and implementation projects provide a good opportunity for guided tours.

Restoration activities will sometimes require the closure and detour of some of the trails that may otherwise be open to public use. Noise from heavy mechanized equipment and chain saws may be annoying to users of adjacent areas. These effects, under all alternatives, would be temporary and would not be expected to significantly reduce or degrade visitation to the Reserve.

Effects of Watershed Restoration on Cultural Resources

Before watershed restoration projects are implemented, work areas will be surveyed for cultural resources, and if any are encountered, the project will be modified based on evaluation by a qualified archaeologist.

Undiscovered cultural resources could be encountered during earthwork conducted as part of watershed restoration. However, most of the earthwork will be conducted in highly disturbed areas (i.e., along former logging roads and associated areas affected by landslides). The likelihood of disturbance of undiscovered cultural resources is therefore relatively low. As noted in chapter 4, if any cultural materials or sites are encountered during ground-disturbing activities, all work will be stopped until a qualified archaeologist has evaluated the find. Accordingly, potential direct impacts on cultural resources are considered less than significant. No potential indirect impacts have been identified.

Forest Restoration

Effects of Forest Restoration on Forest Structure and Old-Growth Characteristics

Effects of Management Common to the Forest Restoration Action Alternatives

The two forest restoration action alternatives (2A and 2B) would entail *density management*, or thinning, of shrub-sapling stands (both alternatives) and pole stands (2A only) in harvested areas

of the Reserve. These actions would be expected to beneficially accelerate seral-stage succession and the development of old-growth characteristics in these harvested stands.

Observed Benefits of Density Management

Redwood and redwood/Douglas-fir stands naturally develop old-growth characteristics over time through the process of succession. Natural thinning of the number of trees in a stand is central to this succession. The shrub/sapling stage in the Reserve generally has 500–3,000 trees per acre (Harrison pers. comm., Bailey 1998), whereas the tertiary stage of this vegetation type typically has approximately 60–80 dominant trees per acre (Collopy pers. comm.). Allowing the stand to thin naturally requires approximately 100–200 years for old-growth stand characteristics to develop, and trees that die in the process remain in the stand structure and greatly increase RSRF.

The benefits of artificial thinning to increase stand productivity and reduce RSRF are well documented in the forest-management literature. Carey (1996) noted that the lack of management after a timber harvest “delayed forest development, compared to thinning with other management techniques.” Scanlon (1992) determined that, in the redwood forests of the Jackson Demonstration State Forest, site quality and amount of available light were the primary constraints on growth. He went on to conclude that thinning was an appropriate means to increasing available light for retained trees and that “a proper thinning prescription applied to a timber stand can be instrumental in achieving management goals.” In a study where thinning in second-growth redwood/Douglas-fir was conducted at four intensities, Oliver et al. (1994) found significant increases in growth parameters as thinning intensity increased, and he noted that leave trees responded with increased growth rates that correlated well with the intensity of thinning.

Thinning can be implemented in two ways: single-tree thinning or variable-density thinning. Single-tree thinning is a uniform approach that leaves fewer trees with wider spacing and a regular distribution. The proposed variable-density thinning (see the “Implementation Guidelines” section under “Forest Restoration” in chapter 4) is a variable approach that thins more heavily in some areas than in others to create a mosaic of densities. Both types of thinning have cognates in natural processes. Single-tree thinning naturally takes place in closely spaced, even-aged stands between the ages of 10 and 80 years. In these stands, individual tree mortality is generally the result of being outcompeted for light, moisture, and/or nutrients. The mortality of these individuals is usually uniformly distributed and leaves a residual stand with evenly spaced trees. The natural model for variable-density thinning is the creation of an opening in the forest canopy by some catastrophic event: windthrow, spot fire, insect or disease focus, or toppling of a large old individual. The result is creation of a small area where light, nutrients, and moisture are available at the surface of the soil, and vegetation suitable to these new conditions populates the site.

Forest stand response to single-tree thinning has been studied primarily from a commercial productivity standpoint, and the advantages in terms of increased growth and survival of residual trees is well documented (Bailey 1998, Oliver 1992, Lindquist 1999, Cussins n.d.). Variable-density thinning, as a prescribed management tool, has not been extensively addressed in the literature. However, its roles in acceleration of growth, the development of structural characteristics of old-growth stands, and increased species diversity has been noted (Carey 1999 and 2000, Sugihara 1992, Piirto n.d.). Adams et al. (n.d.) noted that they observed faster growth rates for all types of group selection (small opening) harvests.

Expected Benefits to the Reserve

For harvested stands in the Reserve, it is anticipated that thinning would accelerate the development of favorable structural characteristics from 100–200 years in untreated stands to approximately 50 years in treated stands. The actual benefit would depend on the thinning program adopted (2A or 2B). Thinning of trees in shrub-sapling stands in seed-tree harvested stands could result in the development of old-growth stand characteristics within 30 years. Pole harvested stands could begin to develop these characteristics in 15–30 years, and such characteristics would begin to develop in the shrub-sapling stands within 30–50 years.

The development of old-growth characteristics, both of individual trees and communities, would result from

- the retention of dominant trees and elimination of slower growth individuals,
- faster tree growth by selected dominant trees as they are released from competition for sunlight and moisture,
- fuller development of tree crowns, and
- variable spacing allowing light penetration.

Proper sizing and topographic placement of the openings would result in increased side lighting and the retention of side branches of selected dominant trees, important features of old-growth forests. Variable spacing would increase species richness by creating opportunities for plant colonization and by contributing woody debris to the forest floor. The more diverse plant communities that are created would be more resistant to catastrophic influences.

Potential Adverse Effects

Removal of up to 75% of the stems under either thinning approach would elevate the risk of loss of individuals and small stands to windthrow. Such losses are not expected to be significant over the long term.

Reduction of the overall number of individual trees during thinning increases the relative importance of the loss of individual trees in the future because of snow breakage, disease, or fire. This increased risk of insufficient numbers of trees is unavoidable, but the probability that tree numbers become limited at the Reserve is very low.

Variable tree spacing would result in colonization of native species, such as blue blossom and tanoak, and invasive nonnative species, such as pampas grass and broom. Such colonization may increase costs of stand maintenance or reduce the competitive advantage of the desirable legacy individuals and increase the time required to attain the desired old-growth stand characteristics. The presence of native colonizers on a limited scale is considered beneficial, but their widespread colonization in openings or a propensity for colonization by invasive nonnative plants would result in a revision to opening specifications and/or other variable-thinning prescription elements. Because of the ability to modify prescriptions through adaptive management, this potential impact is considered less than significant.

Relative Effects of the Forest Restoration Alternatives

Expected Benefits

The extent of forest restoration would differ considerably between the two action alternatives (table 6-3). Under Alternative 2A, the benefits of density management described above could be realized on up to 2,500 acres, consisting of 57% of the harvested stands and nearly one-third of the entire Reserve. Under Alternative 2B, lesser benefits could be realized on approximately 850 acres, consisting of 20% of the harvested stands, or 11% of the entire Reserve. The no-action alternative (2C) would achieve no such benefit.

Table 6-3. Extent of Forest Restoration Candidate Areas

Watershed	Condition	Area ^a (acres)	Percent of Watershed ^a
Upper Little South Fork Elk River (1,500 acres)	Unharvested	1,485	99
	Harvested, mature	0	0
	Harvested, potentially thinned	0	0
	Watershed restoration revegetation	12–15	0.8–1.0
Salmon Creek (3,000 acres)	Unharvested	1,067	36
	Harvested, mature	0	0
	Harvested, potentially thinned	424–1,732	14–58
	Watershed restoration revegetation	181–201	6.0–6.7
Upper South Fork Elk River (1,300 acres)	Unharvested	400	31
	Harvested, mature	217	17
	Harvested, potentially thinned	372–594	29–47
	Watershed restoration revegetation	77–89	5.9–6.8
Lower Little South Fork Elk River (1,200 acres)	Unharvested	0	0
	Harvested, mature	922	77
	Harvested, potentially thinned	50–167	4–14
	Watershed restoration revegetation	71–79	10.1–11.3
Elk River Corridors (400 acres)	Harvested and riparian	400	100
Entire Reserve (7,400 acres)	Unharvested	2,952	40
	Harvested, mature	1,139	15
	Harvested, potentially thinned	846–2,493	11–34
	Watershed restoration revegetation	341–384	4.6–5.2

Note: The distribution of the earlier successional harvested stands that will be potentially subject to thinning is shown in figure 3-4—shrub-sapling harvested, pole harvested, and old-growth harvested stands. BLM proposes to restore from 846 acres (saplings and old-growth harvested only, Alternative 2B) to 2,493 acres (adding pole stands, Alternative 2A) of early seral stage harvested land over a 5-year period. The area treated would be 11–34 % of the entire Reserve. The rate of treatment would be 170–400 acres per year, depending on the selected alternative.

^a For watershed restoration revegetation, range is from Alternative 1B—Hydrologic Stabilization to Alternative 1A—Full Recontour. For harvested, potentially thinned, range is from Alternative 2B—Low Intensity Forest Restoration to Alternative 2A—Medium Intensity Forest Restoration.

The effectiveness of forest restoration would also differ considerably between the two action alternatives. Under Alternative 2A, up to three thinnings would be made in shrub-sapling stands,

allowing them to be gradually guided to the optimum stand condition for development of old-growth characteristics. Pole stands would also be thinned once. Under Alternative 2B, only one entry would be made in shrub-sapling stands, and they would be left to develop naturally thereafter. Pole stands would not be treated. These differences would affect not only stand structures and tree growth but also the amount of woody debris that would be placed on the forest floor.

Potential Adverse Effects

The single entry approach under Alternative 2B would generate considerable slash requiring disposal, either through pile burning or lopping and scattering the material. Pile burning can damage soils locally, and lopping and scattering creates a short-term fuel accumulation aggravating fire risk. Under Alternative 2A, however, a lesser amount of slash would be generated during each entry (which would be separated by intervals of 10 years), reducing the magnitude of these adverse effects.

The stepped, gradual reduction of canopy cover under Alternative 2A would decrease risk of stand damage caused by windthrow relative to Alternative 2B. However, the felling of poles under Alternative 2A would result in the potential for collateral damage to up to 20% of the remaining trees. The potential for infestation of invasive nonnative species in thinning openings would be greater under Alternative 2A than under Alternative 2B. For reasons described above, these potential impacts are considered less than significant.

The no-action alternative (2C) would result in several adverse effects. The retention of overcrowded second-growth stands and reliance on natural thinning processes implies greater threats of widespread disease or insect infestation, unmanaged buildup of both down fuels and fuel ladders as mortality occurs, and, consequently, increased RSRF (see “Effects on Fire Behavior and Fire Management” below). Because Alternative 2C comprises the impact baseline, this effect is not treated as an adverse impact under CEQA/NEPA, but it is a significant adverse effect relative to the other alternatives.

Effects of Forest Restoration on Special-Status Plants

Special-Status Vascular Plant Species

Forest restoration activities will occur in previously disturbed, harvested stands that have a relatively low probability of supporting special-status plant populations. The prior discussion regarding the effects of watershed restoration on special-status plants is almost entirely relevant here. Survey and avoidance actions would be taken prior to any site activities. Most special-status plant species occur in specialized habitats, such as wetlands, meadows, and other natural forest openings, that are not within the restoration treatment areas, and thinning adjacent to these habitats would be carefully planned on a site-specific basis. Over the long term, the increasing amount of later-successional forest stages will tend to increase the habitat for special-status species. The forest restoration program would have little or no impact on special-status species in the near term and beneficial effects over the long term.

Survey-and-Manage Cryptogam Species

Survey-and-Manage fungi and lichen species have been identified in multiple sites and habitats throughout the Reserve, including in several monitoring plots located in areas proposed for forest restoration. Survey-and-Manage cryptogams are typically associated with old-growth forest types, and the accelerated development of old-growth forest characteristics will result in long-term beneficial effects on habitats for these species. However, ground disturbance, small-tree thinning, and understory fuel treatments may adversely affect local populations of Survey-and-Manage cryptogam species during thinning operations over the next 5–20 years.

These temporary effects are expected to be less than significant because of the nature and scale of the proposed actions. The proposed treatments will retain larger, dominant trees, thereby retaining shaded microclimate conditions in the understory and source populations of cryptogams for recolonizing disturbed areas. During the restoration period, the Reserve will retain a sufficient amount of habitat in untreated condition to ensure that the viability of local cryptogam populations will not be threatened. Fungi populations should not be adversely affected by low-intensity piling and burning (McFarland pers. comm.). In addition, variable-density thinning prescriptions that include retaining untreated clumps of trees within a treatment area, coarse woody debris or duff, and hardwood or shrub species (especially tanoak) in the understory would minimize potential changes to habitat used by these species.

Effects of Forest Restoration on Invasive Nonnative Plants

Forest restoration activities are expected to result in the long-term benefit of controlling invasive nonnative species at the Reserve by accelerating the development of old-growth forest types. When these goals are achieved, the well-shaded habitat created will generally be unsuited to infestation by invasive nonnative species that are currently present in California.

The use of vehicles, equipment, and hand tools to treat forest stands will temporarily disturb soil surfaces and may create conditions favorable for invasive nonnative plant establishment and dispersal in the near term. Use of implementation guidelines in chapter 4 (under “Species Management-Invasive Nonnative Plants” and “Recreation Management”), however, will likely prevent weed propagation, dispersal, and establishment in the restoration sites. If invasive nonnative plants significantly colonize thinning sites, thinning prescriptions would be reconfigured. A program to control invasive nonnative plants will be undertaken at the Reserve to eliminate existing infestations, minimize the introduction of new populations, and eliminate new infestations before they become widespread (chapter 4). Because of the ability to modify prescriptions and the commitment to removal of colonizing plants in the near term, the potential impact of infestations by invasive, nonnative plants caused by forest restoration is considered less than significant.

Effects of Forest Restoration on Water Quality and Aquatic Species

Effects of Management Common to Forest Restoration Action Alternatives

Expected Benefits

Forest restoration would promote the development of old-growth characteristics throughout substantial areas of the Reserve. Because watershed conditions control the physical and chemical conditions of streams that drain the Reserve's watersheds, improvements in forest cover over the long term would improve the suitability of aquatic habitats for fish. As old-growth forest characteristics are restored, natural hydrology and sediment transport processes and rates, as well as cooler stream temperatures, would also be restored. Interception and headwater storage of precipitation would increase, resulting in slowed runoff and increased water clarity, which would provide a more constant release of clearer, cooler water to watercourses throughout the year. Increased canopy would increase shading of stream surfaces. All of these changes would increase aquatic habitat suitability.

Potential Adverse Effects

Short-term increases in surface erosion could result from tree density management. Reduced density would allow more precipitation energy to reach vegetation or soils on the forest floor in the first few years following the action. Density management would not require the use of heavy equipment, with the exception of mobile chipper units, which may be employed on the existing road system. Trees would not be yarded, and no roads or skid trails would be maintained for operational access, except in watershed restoration areas. Accordingly, the amount of soil disturbance from thinning operations is expected to be small.

Slash disposal by lopping and scattering or chipping would tend dissipate precipitation energy and slow runoff, reducing potential soil erosion and sediment delivery to streams. Over the long term, these methods of slash disposal would accelerate the recovery of soil structure damaged by logging. Piling and burning of slash would not provide this mitigation, but may be needed where slash volumes are high. Piling and burning also has the potential to damage soil structure and fertility in spots where burning occurs. Piling and burning would be employed on a limited basis; therefore, the potential for increased sediment yield caused by thinning operations is considered less than significant.

Relative Effects of the Forest Restoration Alternatives

Both the expected benefits and the potential adverse effects of forest restoration on aquatic habitats depend on the intensity and extent of the restoration actions. As previously noted, actions under Alternative 2A could be three times as extensive as under Alternative 2B (table 6-3) and involve multiple entries into some stands but would occur over a longer period of time. However, as discussed above, the potential adverse effects of even the more intensive alternative (2A) would be sufficiently small and generally mitigated on-site such that they would be less than significant. Expected long-term benefits would differ considerably among the alternatives. Alternative 2A would involve accelerated restoration of old-growth canopy and favorable storage/runoff conditions over a much larger area of the Reserve.

Under the no-action alternative (2C), recovery of natural hydrologic processes benefiting forest aquatic and riparian habitats would be expected to take substantially longer than would occur under either Alternative 2A or 2B. Alternative 2C also poses the possibility that watershed conditions could be severely damaged by a stand-replacing fire (see “Effects of Forest Restoration on Fire Behavior and Fire Management” below). The resulting loss of cover and soil damage would result in increased soil erosion, alteration of the natural hydrograph, and increased water temperatures, all of which can greatly degrade the suitability of aquatic and riparian habitats for fish and other organisms.

Effects of Forest Restoration on Wildlife

Effects of Management Common to Forest Restoration Action Alternatives

Expected Benefits

Long-term beneficial effects on special-status and common wildlife would result from forest restoration that enhances old-growth forest ecosystems in the Reserve. Preservation and enlargement of the Reserve’s patch of old-growth forest will provide critical habitat for species uniquely dependent on this type of diminishing habitat. Early-successional, disturbed habitat is widespread in the region, so conversion of the Reserve’s harvested lands to preharvest condition diminishes an abundant habitat (early-successional redwood forest) in favor of a limited one (late-successional redwood forest). From a landscape perspective, the relative value to regional wildlife of the habitat created far exceeds that of the habitat lost. In particular, forest restoration would accelerate the expansion of habitat that is critical to the survival of the threatened marbled murrelet and northern spotted owl.

Potential Adverse Effects

Forest restoration activities could result in loss of successional habitat and short-term disturbance to forest and shrub habitat for common species and noise disturbance to breeding birds in treatment areas, adjoining mature harvested stands, or old-growth groves. However, breeding-period closures and other implementation measures described in chapter 4 would prevent any breeding disturbance to species identified as threatened, endangered, candidate, sensitive, or otherwise special-status.

Effects on various wildlife species or species groups are as follows.

Effects on Common Wildlife

The long-term benefit of forest restoration to common wildlife would be an acceleration of forest succession to old-growth habitat in previously harvested areas throughout the Reserve. Common wildlife species that depend on old-growth forest would benefit from the accelerated increase in available suitable habitat over time.

Pole and shrub habitats that currently exist in the Reserve would be significantly altered by the restoration actions. Brush would be removed, saplings and pole-stage trees would be thinned, and slash would be scattered on the forest floor (or in some cases, pile burned) over perhaps 200 acres per year for up to 20 years. These actions would result in direct disturbance to common

species and may cause direct mortality in some cases. The long-term effect on common wildlife would be a reduction in the amount of habitat available to species adapted to early-successional forest habitats. Because these species are locally and regionally abundant and widely distributed, the adverse effect on these species is considered less than significant.

Another short-term impact of forest restoration is the potential for noise to interrupt normal breeding behavior of common birds. Limited operating periods established for federally listed birds, together with mitigation measures established for migratory birds (discussed below), will prevent significant disturbance to breeding common birds.

Effects on Migratory Birds

As with common wildlife species, the long-term indirect effect of forest restoration will be the reduction in the amount of suitable habitat for migratory bird species adapted to edges and disturbed areas, such as American robins and dark-eyed juncos. Because these species are considered locally and regionally abundant and widely distributed, reduction in the amount of available, suitable habitat will not threaten to reduce or eliminate populations.

An estimated 60% of the restoration activities will be restricted to limited operating periods established for nesting marbled murrelets and northern spotted owls (figures 3-6 and 3-7). There may be a small amount of unquantified, unintentional take of migratory bird species.

Effects on Marbled Murrelet and Northern Spotted Owl

Forest restoration would directly benefit marbled murrelet and northern spotted owl. Acceleration of succession of shrublands and young forest stands to old-growth forest will accelerate development of new habitat required by these species. The restoration and enhancement of late-successional old-growth habitat, at the Reserve in particular, is a key component of the recovery plan for both the northern spotted owl and marbled murrelet populations in the region (U.S. Fish and Wildlife Service 1997). When thinned stands begin to reach maturity, the reduction in the amount of suitable habitat available to edge-tolerant corvids will also indirectly benefit these special-status birds.

Existing marbled murrelet and northern spotted owl habitat will not be removed or degraded as a result of the proposed activities. Noise disturbance from restoration activities has the potential to interrupt the normal breeding behavior of marbled murrelets and northern spotted owls in later successional stands near treatment areas. Forest restoration actions that may cause visual or auditory disturbances that are not adequately dampened by vegetative or topographic screening will be restricted by distance buffers of up to 0.25 mile from occupied or suitable habitat of marbled murrelets or northern spotted owls. If buffers cannot be used effectively, limited operating periods will be imposed (September 15–March 23 for murrelet habitat and August 1–January 31 for northern spotted owls).

Effects on Bald Eagle and Osprey

Restoration of old-growth forests in the Reserve will not benefit these species because suitable nesting habitat requires the presence of large water bodies (i.e., lakes, reservoirs, rivers) near the nest locations.

Bald eagle or osprey nesting or roosting habitat will not be affected by the proposed restoration activities in shrub-sapling and pole stands. Because eagles have not been using the Reserve for nesting and are mobile, the potential for noise to disturb the species is minor. If, however, a bald eagle or osprey nest were located in the Reserve before restoration activities were begun or completed, appropriate avoidance measures would be implemented until the young had fledged.

Effects on Amphibians and Reptiles

Restoration of forest ecosystems will benefit terrestrial amphibians over the long term because development of dense canopy cover will be accelerated, which will, in general, produce a moister microclimate on the forest floor. This change will tend to expand and improve the quality of suitable habitat for species such as clouded salamander, black salamander, California slender salamander, and ensatina. Reptiles will not benefit from enhancement of old-growth habitat because they generally require open, sunny areas for basking.

Restoration activities in or adjacent to habitats that support these species have the potential to disturb or harm individual animals. However, habitat for these animals tends to be in riparian and aquatic zones, which are generally excluded from thinning treatments. Alteration of ground level riparian zones by thinning in adjacent stands could temporarily degrade habitat conditions locally. Avoidance measures (chapter 4) will be implemented to preclude these impacts.

Survey-and-Manage Wildlife Species

Enhancement of old-growth habitat and maintenance of a canopy cover near riparian areas will benefit the Del Norte salamander. Because of greater canopy density over time, restoration activities will produce a moister microclimate, enlarging the extent of suitable habitat for this species.

Forest restoration activities would generally not affect suitable habitat for the Del Norte salamander.

Relative Effects of Forest Restoration Activities

Both the expected benefits and the potential adverse effects of forest restoration on wildlife and wildlife habitat depend on the intensity and extent of the restoration actions. As previously noted, actions under Alternative 2A could be three times as extensive as under Alternative 2B (table 6-3) and involve multiple entries into some stands but occur over a longer period of time. However, the potential adverse effects of even the more intensive alternative (2A) would be small or avoided by seasonal closures and predisturbance surveys and avoidance actions where needed. None of the temporary disturbance would threaten to eliminate a species population or significantly reduce the range of species. The impact to wildlife under both action alternatives would be less than significant.

Expected long-term benefits, however, would differ considerably among the alternatives. Alternative 2A would involve accelerated restoration of old-growth canopy and favorable storage/runoff conditions over a much larger area of the Reserve.

Under the no-action alternative (2C), recovery of old-growth characteristics would be expected to take substantially longer than would occur under either Alternatives 2A or 2B. Alternative 2C

also poses the possibility that existing habitats could be severely damaged by a stand-replacing fire (see following section).

Effects of Forest Restoration on Fire Behavior and Fire Management

Effects of Management Common to Forest Restoration Action Alternatives

Expected Benefits

In addition to accelerating the recovery of old-growth characteristics, stand density management would reduce the RSRF. By avoiding losses to fire, this effect would help accelerate the recovery of old-growth characteristics in earlier-successional stands, help to protect adjoining old-growth groves, and reduce risks to adjoining lands. Unthinned pole stands pose the highest RSRF, followed by shrub-sapling stands. Later-successional stands have correspondingly lower RSRF (table 3-9). Removal of the material from the canopy structure and subsequent treatment of the slash would result in lower crown bulk densities, increased average crown base heights, decreased flammable litter layer depths, and discontinuities in both vertical and horizontal fuel structures. If fire ignited one of these stands, flame lengths would be relatively decreased and crown base heights would be relatively higher, greatly reducing the potential for crown fires, whole-stand mortality, and rapid spread into adjoining stands.

Potential Adverse Effects

Proper treatment of slash is required to avoid a potential adverse effect of increased fuel load on the forest floor in the dry seasons following thinning treatments. In dense pole stands, relatively large amounts of slash are created by thinning. In the Reserve, wherever possible, slash will be lopped and scattered or chipped to decompose rapidly in the warm, wet climate. Pile burning may be employed under some circumstances (e.g., drier slopes) where the other methods are infeasible. If average tree spacing in thinned stands is less than 20 feet, slash to be burned will be moved out of the stand or into an opening created under the variable-density thinning approach, to avoid initiating a crown fire in the thinned stand. The proposed slash treatment program will preclude a significant short-term increase in RSRF under the action alternatives.

Forest thinning and slash disposal activities pose the risk of fire ignition caused by exhaust sparks emitted from hand-held and heavy equipment and/or sparks caused by the striking of chainsaw blades on rocks. This adverse effect would be temporary and would be minimized by requiring fire-awareness training of field personnel.

Relative Effects of the Forest Restoration Alternatives

Both of the action alternatives (2A and 2B) would provide the benefits of decreased RSRF, but the benefit afforded by alternative 2A would be much greater. Alternative 2A involves thinning in the highly hazardous pole stands, as well as in the moderately hazardous shrub-sapling stands. Moreover, repeated thinnings in shrub-sapling stands under Alternative 2A would allow for better control of stand flammability as the treated stands developed. As noted in chapter 3, the greatest risk to the primary old-growth grove at the Reserve is the intrusion of a pole harvested stand on a

southwest-facing slope above Salmon Creek. Being a pole stand, it would not be treated under Alternative 2B.

Under Alternative 2C, existing levels of RSRF would increase as the extensive shrub-sapling stands developed into pole stands, and as existing pole stands remained crowded with suppressed growth rates for several decades. Increased RSRF in these stands would represent a significantly increased threat to old-growth groves occupying the ridge tops above these stands. This increased threat is a significant adverse effect of the no-action alternative (2C).

RSRF has two elements: ignition and initial spread, and postignition behavior. Ignition and initial spread is related to public access and is analyzed in the following section. Postignition behavior is most directly related to stand structure and slope position (table 3-9). Differences between the alternatives can therefore be characterized by treated acreages in various risk (RSRF) classes, defined on the basis of seral stage and slope position. As shown on table 6-4, Alternative 2B would treat 1,080 acres, of which 442 acres have high RSRF. Alternative 2A, by including treatment of pole stands, would also treat another 314 acres having high RSRF and 1,363 acres having extreme RSRF. Once treated, these stands would have a low or low-moderate RSRF.

Table 6-4. Risk of Stand-Replacing Fire (RSRF) of Stands to Be Treated under the Forest Restoration Alternatives

Forest Restoration Alternative	Extent of Treated Stands (acres)								Total
	Shrub/Sapling Harvested		Pole Harvested		Mature Harvested		Seed Tree Harvested		
	L 1/3	U 2/3	L 1/3	U 2/3	L 1/3	U 2/3	L 1/3	U 2/3	
2C	0	0	0	0	0	0	0	0	
2B	205	442	0	0	0	0	236	197	1,080
2A	205	442	314	1,363	0	0	236	197	2,757
Risk of stand- replacing fire	M	H	H	E	L–M	M–H	L–M	M	
Notes: L1/3 = lower 1/3 slope position. U2/3 = upper 2/3 slope position. E = extreme risk. H = high risk. M = moderate risk. L = low risk.									

Interdependent Effects of Forest Restoration Alternatives and Public Access Alternatives

The current ignition hazard at the Reserve could be significantly affected by the combined changes in stand flammability (RSRF) and changes in public access to the Reserve. Assuming that risk is increased by human contact with flammable vegetation, changes in this hazard depend primarily on the forest restoration and trail-access alternatives selected. Table 6-5 shows lengths of trail passing through vegetation in various risk classes, based on seral stage and slope position, for each combination of forest restoration and trail-access alternatives. The table captures two counter effects: increased risk caused by more extensive trail systems in some alternatives and decreased risk caused by the various forest restoration alternatives.

Relative to the no-action condition (Alternatives 2C and 4D), the table indicates that the two more extensive trail system alternatives (4A and 4B) would increase present contact between visitors

Table 6-5. Fire Ignition Hazard of the Forest Restoration and Trail Alternatives

Trail Distance in Various Risk Class Vegetation/Slope Position (linear feet)									
Trail System Alternative	Total Trail Length (linear feet)	Forest Restoration Alternative	Relative Risk of Stand-Replacing Fire						Total E, H, and M–H
			L	L–M	M	M–H	H	E	
4A (extensive)	69,788	2A (moderate)	42,870	15,728	0	11,190	0	0	11,190
		2B (low)	31,076	15,728	10,609	11,190	1,185	0	12,375
		2C (none)	19,008	17,676	12,470	11,190	4,345	5,099	20,634
4B (preferred)	45,035	2A (moderate)	18,926	15,728	0	10,381	0	0	10,381
		2B (low)	11,950	15,728	5,791	10,381	1,185	0	11,566
		2C (none)	4,886	17,676	7,652	10,381	1,609	2,831	14,821
4C (Elk River only)	15,530	2A (moderate)	677	14,853	0	0	0	0	0
		2B (low)	0	14,853	677	0	0	0	0
		2C (none)	0	14,853	677	0	0	0	0
4D (no change)	28,650	2A (moderate)	8,408	16,971	0	3,271	0	0	3,271
		2B (low)	2,148	16,971	5,013	3,271	1,247	0	4,518
		2C (none)	200	18,919	5,013	3,271	1,247	0	4,518

Note: Codes for risk of stand-replacing fire:

L = low.
 L-M = low to moderate.
 M = moderate.
 M-H = moderate to high.
 H = high.
 E = extreme.

and the higher RSRF stands (extreme, high, and medium-high) 3.2– 4.6 fold, for alternatives 4B and 4A, respectively. The data in the last column also indicate the relative effectiveness of the two forest restoration alternatives in countering the increased contact. Both alternatives would reduce the contact significantly, but the reduction is most substantial for the most extensive trail system alternative. Considering the high and extreme RSRF categories only, the data indicate that at least one of the forest restoration alternatives must be implemented to prevent an increase in the highest risks associated with the preferred or extensive trail system alternatives. Also apparent is the fact that public contact with high and extreme RSRF stands would only be precluded by selection of the most intense forest restoration alternative (2A) or by substantially limiting access, as under trail system Alternative 4C, which confines visitation to the Elk River corridor.

Effects of Forest Restoration on Recreation Activities

Effects of Management Common to All Forest Restoration Alternatives

Accelerated restoration of old-growth ecosystems would enhance recreation opportunities over the long term by expanding this diminishing habitat and increasing populations of fish and wildlife that depend on old-growth systems. Appropriate public access to this enlarging resource would continue to be made available over the long term.

Potential adverse effects of forest restoration on visitation include temporary noise (from chainsaws and chippers), dust, motor emissions, and, in some cases, smoke. Temporary trail closures for visitor safety and to provide visitor protection from these emissions will temporarily reduce visitors' access opportunities. In sensitive areas that are highly visible to the public, a visual resource analysis will be conducted to determine impacts and appropriate mitigation measures to protect scenic values. Moreover, visual changes, including reduced canopy and increased material on the forest floor, may be considered adverse by some visitors (although some visitors may consider thinning of pole stands to be a visual improvement). Because of the temporary nature of these disturbances and changes and the limited annual period during which they can occur (to protect nesting murrelets and owls), these adverse effects are considered less than significant.

Relative Effects of the Forest Restoration Alternatives

Under Alternative 2A, the visual appearance of stumps of pole-sized trees may also be considered objectionable by some users.

Effects of Forest Restoration on Cultural Resources

Forest restoration activities are generally not land-disturbing and therefore have little potential for disturbing undiscovered cultural resources. Nonetheless, before forest restoration projects are implemented, work areas will be surveyed for cultural resources, and, if any are encountered, the project will be modified based on an evaluation by a qualified archaeologist. If any cultural materials or sites are encountered during forest-thinning activities, all work will be stopped until a qualified archaeologist has evaluated the find. Accordingly, potential direct impacts on cultural resources are considered less than significant. No potential indirect impacts have been identified.

Research Management

Effects of Research Management on Research Activities

Goals, direction, and implementation guidelines established in chapter 4 for management of research will ensure that a wide range of research is carried out at the Reserve. The research permit process will help people writing proposals assess the relevance of their work to long-term management of the Reserve and adjust their proposal protocols to minimize adverse effects to the Reserve's ecosystems. Basic research that may have no apparent or direct application to management of the Reserve will not be excluded, however. BLM and DFG recognize the need for research into basic ecosystem process, structure, and function and that unharvested areas of the Reserve where natural conditions are relatively intact can serve as a baseline. Thus, research management is expected to encourage both applied and pure research and to improve the quality or diminish unnecessary adverse effects of such research.

Effects of Research Management on Biological Resources

As described in chapter 4, research proposals will be screened and modified as necessary to ensure that no significant harm to the Reserve's biological resources will result from research conducted in the Reserve. For example, research into life stages of threatened species using the Reserve will not be allowed if a potential exists for the research field activities to

- diminish species numbers,
- interrupt or significantly disturb reproductive or other species activity, or
- otherwise diminish the prognosis for species sustenance at the Reserve or in other affected areas.

Because of the long distance to the central (old-growth) portion of the Reserve, some researchers may request that field personnel be allowed to use motorized trail vehicles for a easier access or to occupy the Reserve on an overnight basis. Such proposals will be evaluated on a case-by-case basis, according to evaluation criteria in chapter 4. Motorized access would be considered only for the Elk River corridor, and would be granted only if the alternative to overnight occupancy would entail greater potential adverse effect on the Reserve's ecosystems. Overnight occupancy, where it is approved, would be subject to the implementation guidelines in chapter 4, which are intended to eliminate the possibility that corvid intrusion will be encouraged by the occupancy. No such occupancy would be permitted within ¼ mile of old-growth groves or within 150 feet of streams.

Considering the proposed provisions of the research management program, potential impacts on biological resources are considered less than significant.

Effects of Research Management on Resource Monitoring

Some of the research that will be approved in the Reserve is expected to contribute resource monitoring data that are needed to assess the effects of plan implementation (table 4-7). Researchers will be encouraged to modify research proposals to provide such information, where

it is consistent with the intended research, and to share results of research with BLM managers. Thus, research management may provide a benefit to the needed resource monitoring program.

Fire Management

Aspects of fire management involving fuel hazards and public access affecting potential ignition of fire were discussed in “Effects of Forest Restoration on Fire Behavior and Fire Management” above. Accordingly, this section focuses only on fire suppression.

Effects of Fire Suppression on Fire Frequency and Behavior

As described in chapter 4, most fire originating or entering second-growth forests would be met with a full-suppression response using a minimum-impact strategy. Fire in old-growth stands may or may not be allowed to continue burning, based on a site-specific, weather-specific assessment.

Unlike many forests in the drier interior, coastal redwood forests of California are not considered fire-dependent forests that rely on a high fire frequency for regeneration or sustenance of forest ecosystem processes. The natural fire frequency in the region is on the order of hundreds of years (chapter 3); therefore, fire is not a major determinant of ecosystem structure, process, or function. Accordingly, full suppression of fire would not be expected to result in changes in species dominance (e.g., increasing dominance by shade-tolerant species) or cause significant changes to forest structure or function that would increase fire frequency or intensity in the future. The Reserve’s forests are not subject to the phenomena plaguing management of pine forests throughout the western United States, where fire suppression has increased the potential for fire damage over the long term.

The case-by-case decision to allow or suppress fire in old-growth groves would also have relatively little bearing on future fire frequency and behavior in these stands. Allowing fire to burn when prescriptive conditions are met may prevent or reduce damage from future fires that burn when prescriptive conditions are not met.

Effects of Fire Suppression on Biological Resources

Fire suppression activities in second-growth forest in harvested areas may temporarily degrade biological resources, but absence of suppression would likely cause catastrophic degradation of these resources (see discussion of the relative RSRF of the various seral stages under “Fire Regime and Hazard” in chapter 3).

Suppression may include the construction of fire lines by hand or by dozer. The use of dozers would be confined to ridge tops in harvested portions of the Reserve to the extent possible, but dozers could be required in other harvested areas as well. Full rehabilitation of dozer lines would be required after fire suppression is completed. Rehabilitation would involve recontouring soil surfaces to their natural topography, placing removed vegetation over the finished soils as a mulch, and planting native trees and shrubs if natural colonization is expected to be slow.

The temporary ground-disturbing effects of fire suppression, mitigated to a substantial degree by line rehabilitation, is insignificant compared to the severe effects of the fires being suppressed. The fire suppression impact is considered less than significant.

Noise disturbance to nesting birds (e.g., marbled murrelet and spotted owl) may result from fire suppression activities in nearby second-growth forests. The effect would be relatively small compared to the disturbance posed by the fire itself. Given this small effect and the relative infrequency of fire, this potential adverse effect is also considered less than significant.

Effects of Fire Suppression on Research

Fire suppression in old-growth groves, if any is required, may diminish the value of these stands in the Reserve as a natural biological baseline. This potential adverse effect, because it is expected to occur so infrequently, is not considered significant.

Effects of Fire Suppression on Recreation

Fire and fire suppression would probably require closure of some or all of the Reserve during the suppression activities. Such events are expected to be very infrequent and of short duration; therefore, the adverse effect on recreation is considered less than significant.

Visual Resource Management

Because of the legislative direction and various management goals for the Reserve, none of the alternatives include plans for actions that would have long-term negative impacts on visual qualities. Some road restoration projects will have detrimental effects on visual quality in the short term because the temporary removal of vegetation will cause color contrasts. Forest restoration and trail construction activities will also result in temporary visual contrasts of color and texture compared with the natural landscape. However, implementation of any of the alternatives will greatly improve the Reserve's visual qualities in the long term. By removing road networks and accelerating changes in forest to an old-growth composition, the contrasts from recent human activities will be reduced and the area will revert to a naturally appearing landscape. Within 25 years, almost all of the 2,750 acres that fall under VRM Class 3 (see appendix E) will be improved so that they can fall into the Class 2 category, where the appearance of the landscape is more natural. The only area of the Reserve remaining in a Class 3 zone would be the first three miles of the Elk River corridor. None of these effects are significantly adverse.

Recreation Management

Effects of Recreation Management on Visitor Experiences

Effects of Management Common to All Recreation Alternatives

All alternatives provide sufficient public access to the Reserve. The Elk River Trail extends nearly three miles into the Reserve with a gentle gradient adjacent to the riparian woodland along the South Fork Elk River. It would remain open and maintained all year under all alternatives. Along the trail corridor, spur or loop trails would lead to a self-guided nature walk, interpretive sites of historical properties, contact with the river, and picnic-table sites. A pavilion for recreation tours and group activities would be constructed a short walk from the trailhead. Three of four trail alternatives are formulated to also allow contact with old-growth ecosystems. Restrooms and gravel parking areas will be provided at all trailheads.

A multifaceted recreation program, both off- and on-site would be conducted to enhance public understanding of the Reserve's resources and threats to its ecological integrity. Guided walks by naturalist rangers would be conducted regularly during the summer season. Interpretive kiosks will be installed at all trailheads. Development of a visitor center in the vicinity of the Reserve will be explored. This recreation program will result in high-quality visitation experiences.

All lands within the Reserve will be managed according to direction for BLM's various visitor management zones and visual resource management classes (appendices E and F). These guidelines will help to minimize the impacts of visitation on the Reserve's ecological integrity and will not adversely affect visitor opportunities.

All visitor access will be confined to designated trails. This restriction may displease those visitors who would like to explore the Reserve by cross-country hiking. This dissatisfaction would be reduced by the two alternatives that allow some entry into old-growth groves.

Seasonal and hourly restrictions on trail use to protect nesting marbled murrelet and northern spotted owl and to protect trails from water damage will disappoint some visitors at certain times of the year. This effect can be largely diminished by continuing to widely publicize these restrictions.

Fishing, hunting, trapping, camping (except for Alternative 4A), and motorized vehicle use will continue to be prohibited in the Reserve. Equestrian and mountain biking uses may also continue to be prohibited (depending on alternatives selected). Recreationists seeking these types of activities will have to rely on other recreation opportunities elsewhere in the region. As these uses were not available within the Reserve prior to acquisition, any decisions to not allow these uses would not decrease the availability of these opportunities within the region.

Relative Effects of the Recreation Alternatives

Alternatives for Availability of Southern Access

Alternative 3A would allow access to the Salmon Pass Trailhead via Newburg and Felt Springs Roads by individual vehicles at times during daylight hours of open seasons when the Felt Springs Road gate is unlocked. This alternative would allow unescorted visitor use of Reserve trails reached by the southern access route. This alternative would benefit some visitors by

allowing independent exploration of the Reserve's ecosystem. However, visitors would also lack the benefit of guided, interpretive hikes such as those provided under Alternative 3B. A means of mitigating this deprivation would be to grant permission for unescorted use by permit at the close of a BLM guided tour.

Alternative 3B, continuation of interim management, would entail BLM providing guided, interpretive hikes in lieu of individual exploration. Access to the Salmon Pass Trailhead and associated trails would be restricted to scheduled, guided interpretive hikes involving BLM-organized vehicle convoys or shuttle service. Visitors would be required to remain with the tour group. This controlled type of access would provide a less autonomous visitation experience than under Alternative 3A, but guided access to the Reserve would be conducted throughout the entire trail system selected.

Alternative 3C would eliminate the southern access and thereby allow public access only to the Elk River Trailhead on the north side of the Reserve. This alternative would require visitors who are seeking to experience old-growth forests to undertake an arduous hike. From the Elk River Trailhead, access to old-growth groves requires a 11.2-mile round-trip day hike, whereas from the Salmon-Alicia Pass area, an old-growth grove could be reached by a short walk (although a 2.6-mile round-trip hike on the Salmon Pass Trail is now required).

Relative to existing management of the southern access (Alternative 3B), only Alternative 3C would adversely affect the quality or type of visitor experience of the Reserve. This alternative would eliminate the potential opportunity (otherwise provided by Alternatives 4a and 4b) for elderly and disabled persons to experience the Reserve's old-growth ecosystems, the resource that compelled public acquisition of these lands.

Alternatives for Extent of Trail System

Various trail system alternatives were described in chapter 5 (figure 5-1, tables 5-1 and 5-2). Each of four alternatives would provide a different level of contact with old-growth ecosystems.

Alternative 4A would provide extensive opportunities for old-growth contact. Northern access routes would include a reconstructed Elk River Corridor Trail and a relocated Little South Fork Elk River Trail with a terminal loop through the northern old-growth grove. Southern access routes would include the existing Salmon Creek Trail, new Salmon Creek Spur Trail and Salmon Creek Loop Trails (2), Universal Access Trail, and the Alicia Pass Loop Trail, each of which would provide contact with old-growth. Additionally, the Western Periphery Trail and Historic Military Ridge Trail would connect the northern and southern portions of the Reserve and pass through the central old-growth groves, the latter for 2.4 miles. Such a trail system would offer the general public, as well as elderly and disabled visitors, a full range of opportunities to experience old-growth ecosystems. The Alicia Pass Loop and Universal Access Trail (wheelchair accessible) would offer short walks with gentle gradients for convenient entry into the southern old-growth grove. In contrast, the Historic Military Ridge Trail, reached by a long, arduous hike, would allow the visitor extended contact (2.4 miles) within the heart of the main old-growth grove.

Alternative 4B would also provide old-growth contact but less so. The Universal Access Trail and the relocated Little South Fork Elk River Trail would allow walking and hiking in old-growth groves—the first entailing an easy stroll, the second requiring an arduous hike. This alternative would exclude the Alicia Pass Loop Trail and the two north-south connecting trails and therefore provides less diversity and intensity of old-growth experience. Old-growth edge contact and

close viewing would continue to be available from the existing Salmon Creek Trail and from the new Salmon Creek Trail Loops and Spur. This alternative therefore provides access to old-growth groves for elderly and disabled visitors. Access is less extensive for other members of the public.

Alternative 4C, while allowing trail access to the South Fork Elk River riparian zone of the Reserve, would prevent access to old-growth groves to maximize protection of ecosystem integrity. This alternative would displease those visitors seeking to experience the old-growth forests of the Reserve. As noted previously, a robust recreation program would nevertheless be conducted in the Reserve, focused on the riparian, historical, and aesthetic resources of the Elk River corridor.

Alternative 4D would continue existing access conditions, which permit close viewing of old-growth from the north (via the Elk River Corridor Trail and the existing Little South Fork Elk River Trail) and edge contact and near viewing of old-growth from the south (Salmon Creek Trail). An arduous hike of 11.2 miles (round-trip) from the Elk River Trailhead or a shorter hike of at least 2.6 miles (round-trip), both involving steep sections of trail, would be required to achieve these old-growth experiences. Thus, this alternative does not provide opportunities for the elderly and disabled, who may require shorter hikes or wheelchair access with gentle gradients. This alternative represents no change from existing conditions.

Relative to the existing extent of the trail system (Alternative 4D), only Alternative 4C poses a significant impact to the quality or type of visitor experience of the Reserve. This alternative would eliminate the public's opportunity to experience to some degree the old-growth ecosystems for which the Reserve property was acquired.

Alternatives for Bicycle Use

Regional Mountain Biking Opportunities

As described in chapter 3, numerous recreation opportunities exist for mountain bicyclists in Humboldt County and in the Humboldt Bay region (figure 3-9), and several recreation sites have unused capacity for this activity (table 3-11). The extent of trails on inventoried sites ranges from 7 to approximately 45 miles, with a combined total of approximately 100 miles. The quality of trails ranges from moderate to high, and the level of challenge ranges from easy to difficult. Environments accessed include both forest and coastal plain. Managers of some sites have plans to increase capacity to keep abreast of demand (i.e., Redwood National/State Parks, Humboldt Redwoods State Park, and Arcata City Forest).

Potential Adverse Effects of Mountain Biking on Visitor Experiences

Mountain biking is an outdoor activity that emphasizes exercise and, on downhill trail segments, speed. It involves relatively rapid passage through surroundings and, as such, is generally less compatible with the emphasis at the Reserve on the more contemplative activities of interpretation and education about natural and cultural resources.

Alternatives Comparison

Two alternatives for introducing bicycle use into certain areas of the Reserve were formulated. More widespread use of bicycles was initially considered but rejected for the majority of the existing or potential trails where gradients are steep and widths narrow (appendix J).

Alternative 5A would accommodate cycling on widened trails or on former roads having greater width, to reduce recreation user conflicts. These trails would include the Elk River Corridor

Trail, the Salmon Creek Trail, and the new Little South Fork Elk River Trail. This alternative would benefit cyclists by allowing maximum cycling opportunities in the Reserve (4.8 miles) but would present a potential adverse effect on hikers and equestrians by increasing the risk of collision or panic response, especially on the steeper Salmon Creek Trail and new Little South Fork Elk River Trail. It would also present the potential to disrupt other recreation tours or individual contemplation in the Reserve.

Alternative 5B would accommodate cycling only on the Elk River Corridor Trail (2.9 miles, or 5.8 miles round trip). This alternative would provide less benefit than Alternative 5A to cyclists by not providing any cycling from the southern access. Accordingly, it would eliminate the potential for conflicts with other users along the Salmon Creek Trail and new Little South Fork Elk River Trail.

Alternative 5C would not accommodate bicycle use in the Reserve, continuing current management. Cyclists living in the Humboldt Bay region would need to continue relying on other recreation opportunities in the region (table 3-11), which are available to absorb increased use. Although this alternative would provide no benefit to cyclists, it would eliminate the potential for conflicts with other users and the need to develop minimal facilities.

Conclusion

As discussed, alternatives introducing bicycle use into the Reserve (5A and 5B) would create a collision hazard and other conflicts with equestrians and hikers, and would detract from the interpretive/educational focus of recreation management at the Reserve. This adverse effect is potentially significant. It may be partially mitigated by selecting Alternative 5B rather than 5A and by limiting bicycle use to certain days of the week.

Alternatives for Equestrian Use

Regional Equestrian Opportunities

As described in chapter 3, numerous recreation opportunities exist for equestrians in Humboldt County and in the Humboldt Bay region (figure 3-9), and several recreation sites have unused capacity for this activity (table 3-11). The extent of trails on inventoried sites ranges from 3 to 50 miles, with a combined total of more than 130 miles. Adequate parking for horse trailers and loading activities have been developed at these sites, and six of the seven sites have direct trail access from off-site locations. The quality of trails ranges from moderate to high, but some sites do not have adequate stock-water facilities. Environments accessed include both forest and coastal plain. Managers of some sites have plans to increase capacity to keep abreast of demand (i.e., Redwood National/State Parks, Humboldt Redwoods State Park, and Arcata City Forest).

Potential Adverse Effects of Equestrian Use on Visitors' Experiences

Equestrian activity on trails in the Reserve would be consistent with the interpretive/educational focus of recreation management at the Reserve and would not pose a safety hazard to other users. However, conflicts between hikers and equestrians do exist. Recreation users may find the littering of trails with horse excrement to be unpleasant. Complaints commonly cite excrement odor, difficulty in walking without excrement contact, increased populations of annoying flies, and dusty and unstable trail surfaces.

Equestrian use would require that trails open for use be constructed and/or maintained to a wide-trail standard, allowing users moving in opposite directions to pass one another. Trail widths would need to be about twice as wide as for hiking-only trails, and total width considering cut and fill slopes would be correspondingly larger. Watering sources, isolated from natural waters,

would need to be developed at appropriate intervals (every 12 miles) along the trails. Trailhead parking would need to be enlarged to accommodate parking of trailers and stock loading activities. Accordingly, minimal facilities necessary to provide public access to the Reserve would need to be constructed or maintained to accommodate equestrian use.

Alternatives Comparison

Two alternatives for introducing equestrian use into certain areas of the Reserve were formulated. More widespread equestrian use was initially considered but rejected because expanded parking facilities at southern access trailheads cannot feasibly be developed (appendix J).

Alternative 6A would accommodate horseback riding on the Elk River Corridor Trail and Little South Fork Elk River Trail. This alternative would benefit equestrians by providing an opportunity for a long ride (10–11 miles round-trip), which allows access to both riparian and old-growth habitats. Potential adverse effects include a greater extent of annoyance caused by horse excrement and trail wear and minimal facilities development.

Alternative 6B would accommodate equestrian use only on the Elk River Corridor Trail, providing equestrians with a shorter ride (5.8 miles round-trip) in riparian habitats. No access to old-growth groves would be provided. Horse excrement and trail wear issues and minimal facilities development would be limited to the Elk River corridor.

Alternative 6C would not accommodate horseback riding in the Reserve, continuing current management. Equestrians living in the Humboldt Bay region would need to continue relying on other recreation opportunities in the region (table 3-11), which are available to absorb increased use. This alternative would provide no benefit to equestrians but would avoid excrement and trail condition issues with other users and the need to develop more than minimal facilities.

Conclusion

As discussed, alternatives introducing equestrian use into the Reserve (6A and 6B) would cause annoyance to hikers due to horse excrement, dusty and rough trail surfaces, and the necessity to stop or move aside for horses to pass. These adverse effects would be considered significant to some users and not to others. They may be slightly mitigated by selecting alternative 6B rather than 6A and by limiting equestrian use to certain days of the week. Equestrian use would also involve constructing minimal facilities necessary to provide public access to the Reserve, contrary to legislative direction for Reserve management (chapter 2). The effect is considered to be significant.

Effects of Recreation on Special-Status Plants

Human access into the Reserve may directly affect special-status plant species, including Survey-and-Manage cryptogams, because of new trail construction, trampling, or unauthorized collecting if trails are situated within or adjacent to special-status plant populations. Predesign surveys will determine if any special-status plant populations occur within new trail alignment corridors. If occurrences are found, new trails will be sited away from such populations. Prohibitions on off-trail hiking and plant collecting will minimize the potential for damage to or loss of such plants. These measures reduce the potential for adverse effects on special-status plant populations to less than significant.

Effects of Recreation on Invasive Nonnative Species

New populations of invasive nonnative species may colonize the Reserve due primarily to two aspects of recreation. First, the construction of new trails would remove both surface and brush canopy vegetation, exposing disturbed soils to possible germination and increasing sunlight, which favors invasives requiring full sunlight, such as pampas grass. The potential for this effect corresponds to the trail lengths of the various trail system alternatives (4A–4D), which are shown in tables 5-1 and 5-2, and the widths of trails constructed, which depend on whether equestrian uses are accommodated (Alternatives 5A, 5B, 6A, and 6B). Wider trails, rather than longer trails, pose the greatest potential for infestation because of the sunlight openings that wider trails create.

Second, the introduction of equestrian uses could promote the introduction of seed into the Reserve via horse excrement, hide, hooves, or trailer bedding. Yellow star thistle is not likely to be introduced by horse excrement because plants are inedible when the seeds are developed. Plants of most concern would be nonnative annual grasses, such as ripgut brome and quaking grass. This potential would be minimized by use of implementation guidelines described in chapter 4 for preventing the spread of noxious weeds and pathogens by equestrians.

Reserve managers are presently inventorying and mapping invasive nonnative species populations in the Reserve and prioritizing eradication efforts. The prioritization of eradication actions in areas likely to be used by equestrians or where infestation along new or existing trail openings is possible will minimize the potential for the spread or establishment of new populations.

Based on the current levels of infestation in the Reserve and measures to be taken to prevent new or eliminate existing infestation, the potential for the spread of invasive nonnative species caused by various recreation alternatives is currently considered less than significant. However, this conclusion should be reconsidered at least every five years, based on results of monitoring these species (table 4-7).

Effects of Recreation Management on Aquatic Ecosystems

Effects of Management Common to All Recreation Alternatives

Aquatic habitats or fish would not directly benefit from public access to the Reserve. However, indirect benefits to the aquatic resource could result from increased public awareness of the unique forest resources of the Reserve as a result of interpretive walks and school and community outreach programs.

Because flowing water tends to attract and concentrate visitors, streams in the Reserve are likely to be adversely affected by public use. Clark and Gibbons (1991) report that recreation use can affect steelhead and salmon habitat in the following ways:

- riparian vegetation disturbances can influence erosion, cover, food sources, and water quality;
- instream disturbances can affect stream morphology, water quality, streamflow, substrate, and debris; and
- upland disturbances in soils and vegetation can affect runoff and erosion.

In the Reserve in particular, continued or increased public access could result in increased:

- destruction of riparian cover along South Fork Elk River and perhaps other streams,
- soil erosion and sedimentation of aquatic habitats caused by trail erosion,
- soil erosion and sedimentation caused by off-trail and streambank activities,
- water contamination with human or animal wastes or soaps, and
- direct disturbance of spawning fish.

Regulations imposed under all alternatives and posted at trailheads would prohibit cutting or destroying vegetation, digging soils, hiking off-trail, disposing human waste improperly, discharging soaps or other pollutants to streams, allowing horse contact with natural waters (for equestrian alternatives), fishing, and disturbing aquatic organisms. Though these regulations will be effective in reducing incidences of these types of impacts, some impact to aquatic habitat quality must be anticipated. Impacts will depend on the *extensiveness* of human contact with streams and the *intensity* of contact in particular areas. Because of the intensity of use along the Elk River Corridor Trail, most of the impacts of public access on aquatic habitats will occur in the Elk River corridor portion of the Reserve.

Although the potential exists for the types of adverse effects listed above on fish and aquatic habitats, it is likely that they can be controlled in the Elk River corridor through law enforcement efforts. Under alternatives that allow extensive public access, however, these impacts may become significant.

Relative Effects of the Recreation Alternatives

Alternatives for Availability of Southern Access

Unescorted southern access to Reserve trails (Alternative 3A) could result in additional soil erosion and sedimentation of aquatic habitats. Unescorted trail access results in a greater potential for increased soil erosion from increased trail use, switchback cutting, and off-trail hiking, particularly along watercourses. Off-trail hiking along watercourses could also lead to more frequent disturbances to fish. These are potentially significant impacts. The current and preferred approach of limiting the southern access to guided tours (Alternative 3B) would have substantially less potential for such adverse impacts. Alternative 3C would reduce the current small potential for adverse effects on fish and fish habitat because no access to the southern boundary would be provided at all.

Alternatives for Extent of Trail System

Under all alternatives, use of the Elk River corridor would be intensive, and the types of impacts previously described would all occur. The trail is near the river throughout the 2.9-mile reach, and new spur trails (except under Alternative 4D) would lead to riverbank areas. As noted, law enforcement activities can be focused in this area, and impacts can probably be minimized.

New trail construction and the more extensive use it would cause in the core of the Reserve under two alternatives could result in additional soil erosion and sedimentation of aquatic habitats, particularly where trail features are close to watercourses or on steep slopes. Alternative 4A, which has the most extensive trail system of the four alternatives, would run the greatest risk of direct disturbance of fish by visitors because of the extensiveness and remoteness of the proposed trail network, the difficulty to provide adequate security patrol, and the proximity of the trail

network to perennial streams. A minimum of four crossings of perennial streams would be involved beyond the Elk River corridor. The potential fish and aquatic habitat impacts of alternative 4A are considered significant.

Under Alternative 4B, the new trail network would be less extensive than under Alternative 4A (without the Alicia Pass Loop Trail and the two north-south connecting trails) and thereby entail only two stream crossings. The difficulties in patrolling the north-south connecting trails would be eliminated.

Under the no-action alternative (4D), two stream crossings beyond the Elk River corridor are also involved. However, the potential for adverse impacts on fish and aquatic habitats under this baseline alternative would be less than those for Alternative 4B because the extent of the trail network would be considerably less.

Alternative 4C would beneficially affect fish and aquatic habitats in the Reserve because only the New Elk River Corridor Trail would be accessible to visitors.

Alternatives for Bicycle Use

Trails accommodating bicycle use would increase maintenance needs. Surface soil erosion exacerbated by bicycle use would require increased maintenance. Bicycle use also affects trail surfaces to a greater degree than hiking, tending to dislodge more sediment and increase sediment yield during precipitation events.

As a result, bicycle use would tend to increase sedimentation of aquatic habitats. The greatest potential for soil erosion and sedimentation would occur where trails have steep gradients or cross slopes, lie near streams, or are used during periods when soils are saturated. This effect would be greatest for the alternative allowing the most extensive bicycle use (Alternative 5A), particularly along the steeper Salmon Creek Trail. The impact of this alternative is potentially significant. Under Alternative 5B, bicycling would only be permitted along the Elk River corridor; therefore, the potential for sedimentation impacts would be less. Because the existing trail in the Elk River corridor is on a preexisting roadbed of sufficient width to accommodate bicycles and has gentle trail gradients, this effect could be largely prevented through site-specific redesign of problem segments. Under the no-action alternative (5C), bicycle use would continue to not be accommodated on any of the trails in the Reserve, precluding any increase in erosion and sedimentation of aquatic habitats.

Alternatives for Equestrian Use

As with bicycle use, trails to accommodate equestrian use must be designed and maintained to a wider standard to reduce the conflict inherent in providing access for different types of users. Whereas trail widths of 3–4 feet may accommodate hikers, trail widths of 5–6 feet are needed to allow concurrent hiking and equestrian use. Depending on the steepness of the terrain that is traversed, wider trail width may require considerably greater total width of construction disturbance, volume of material moved, and area of cut- and fill-slopes exposed to precipitation and runoff. As previously noted, such trails would be more than the minimal necessary facilities needed to provide for public access to the Reserve.

Trails accommodating equestrian use would also increase maintenance needs. Wider trail sections result in larger volumes of earth placed in unnatural, less-stable configurations and wider

disturbed surfaces exposed to precipitation and runoff. With relatively larger potentials for both mass instability and surface erosion, such trails inherently require more maintenance. Equestrian use also impacts trail surfaces to a greater degree than hiking, dislodging more sediment and increasing sediment yield during precipitation events.

As a result, equestrian use would tend to increase sedimentation of aquatic habitats. The greatest potential for soil erosion and sedimentation would occur where trails have steep gradients or cross slopes, lie near streams, or are used during periods when soils are saturated. This effect would be greatest for the alternative allowing the most extensive equestrian use (Alternative 6A), particularly along the steeper New Little Salmon Creek Trail. The impact of this alternative is potentially significant. Under Alternative 5B, equestrian use would only be permitted along the Elk River corridor; therefore, the potential for sedimentation impacts would be less. Because the existing trail in the Elk River corridor is on a preexisting roadbed of sufficient width to accommodate bicycles and has gentle trail gradients, this effect could be largely prevented through site-specific redesign of problem segments. Under the no-action alternative (5C), equestrian use would continue to not be accommodated on any of the trails in the Reserve, precluding any increase in erosion and sedimentation of aquatic habitats.

Effects of Recreation on Wildlife

Effects of Management Common to All Recreation Alternatives

Terrestrial habitats or wildlife would not directly benefit from public access to the Reserve. However, indirect benefits to these resources could result from increased public awareness of the unique forest resources of the Reserve as a result of interpretive walks and school and community outreach programs.

Wildlife resources could be adversely affected by human access into the Reserve. Potential impacts differ primarily by the extent of the trail system developed in the Reserve, the timing of access, and by the type of uses accommodated. A variety of uses has been proposed—walking/hiking, horseback riding, bicycling, and dog exercise—all of which have the potential to adversely affect wildlife.

This section has two parts. The first part assesses the beneficial implications of individual elements of species management direction for all alternatives. The second part assesses the effects on various species or species groups addressed in chapters 3 and 4.

Effects of General Management Direction

Prohibition of Off-Trail Hiking, Possession of Firearms, and Fishing

A major protection of wildlife at the Reserve under all alternatives will result from the prohibition of off-trail hiking. By restricting recreationists to existing trails, disturbance becomes more predictable to wildlife, and wildlife species will either avoid the trails or become more tolerant of nearby human activity (Papouchis et al. in prep.). The prohibition of firearms and fishing would reduce the temptation for users of the Reserve to violate the prohibition on off-trail hiking.

Overnight Camping

A second major protection of wildlife would result from the closure of the Reserve to overnight camping. Many wildlife species are active during dawn and dusk (crepuscular periods). By restricting use during these hours, impacts on wildlife will be greatly minimized.

Corvid Management

An indirect, adverse impact that may result from public consumption of food at the Reserve is the potential for corvids and other human commensal species to colonize areas of the Reserve. Use of guidelines for corvid control presented in chapter 4 are intended to minimize or eliminate human food wastes, and enforcement of regulations in this regard will be critical to the success of these measures. Corvid populations will be intensively monitored for the next three years and thereafter as appears warranted. If minimization measures are not effective, new measures would be established. The potential for corvids to impact wildlife is discussed in more detail under “Effects on Marbled Murrelets.”

Trail Use Restrictions

Access to trails will result in direct disturbance to a small amount of habitat and the potential for noise from human activity to disturb wildlife inhabiting surrounding areas. In particular, human activity could disturb nesting birds, resulting in the abandonment of the breeding effort by failure to initiate nesting, failure to complete incubation, disruption of feeding young, or premature dispersal of juveniles. However, given the anticipated intensity of use, it is unlikely that this infrequent disturbance would significantly affect breeding birds.

Access to central portions of the Reserve would be restricted on seasonal and hourly bases, depending on trail proximity to suitable and occupied marbled murrelet and northern spotted owl habitat. These seasonal closures will protect nesting of these species and simultaneously reduce impacts on other wildlife species within the established no-disturbance buffers. The overnight camping closure will minimize impacts on those wildlife species active during crepuscular periods.

Dog Control

Direct impacts on wildlife from the dogs in the Reserve will be minimized by limiting dogs to the Elk River corridor and requiring that they be leashed. Enforcement of dog-control regulations will be critical to the success of these measures.

Effects on Common Wildlife

A change in species composition in the vicinity of trails is predictable. Wildlife sensitive to human presence will avoid trails, while those wildlife species tolerant of human presence will inhabit these corridors.

Common wildlife in the areas immediately adjacent to proposed trails (up to 250 feet) may be adversely affected by noise disturbance (Miller et al. 1998). Among alternatives considered, this area of disturbance ranges from approximately 180 acres to 980 acres (table 6-6), or 2.4–13.2% of the Reserve. As the harvested forests at the Reserve mature, noise attenuation will increase, and this area will diminish.

The five elements of species management direction described above will minimize impacts on common species. These initiatives will be implemented through educational signs and programs about wildlife disturbance and through enforcement of compliance with regulations.

Table 6-6. Area of Wildlife Habitat Disturbance for the Recreation Alternatives

Alternative	Habitat Directly Disturbed (acres)	Habitat Subject to Potential Noise Disturbance (acres)	Total Habitat Disturbed (acres)
4A: Extensive old-growth contact experience	11.7	976.0	987.7
4B: Limited old-growth contact experience (preferred)	6.7	555.7	562.4
4C: No old-growth contact experience	2.1	177.7	179.8
4D: Existing trail system (no action)	5.5	460.4	465.9

Effects on Migratory Birds

Migratory bird species with a low tolerance for human disturbance may be adversely affected by human activity in the Reserve. Populations of migratory bird species that are tolerant of human use in and around the trails will increase.

Recreation use of trails may interrupt normal breeding behavior of these birds and prevent sensitive and rare birds (e.g., pygmy nuthatch) from nesting in the vicinity of trails (Miller et al. 1998). In most of the Reserve, this impact will be avoided by the seasonal and camping closures for marbled murrelet and spotted owl. Restricting human activity to trails will help greatly to minimize the impact on breeding migratory birds. Some limited insignificant adverse impacts may occur.

Effects on Marbled Murrelet

Suitable habitat for the marbled murrelet would not be directly altered as a result of recreation activities. New trail construction will be undertaken outside of the nesting season.

Under more extensive access alternatives, human activity in the vicinity of and along trails in the Reserve could cause direct disturbance to nesting marbled murrelets. Individual murrelets will differ in their responses to human activity, possibly depending on degree of habituation. For example, in Big Basin Redwoods State Park (Santa Cruz County, California), nesting marbled murrelets are relatively tolerant of humans traveling on trails adjacent to nests (Singer et al. 1991 and 1992). However, Hamer and Nelson (1998) observed adults delaying or aborting feeding and incubation exchanges as a result of humans on the ground near the nest tree. However, at the Reserve, potential disturbance from hikers will be minimized through the implementation guidelines specified in chapter 4.

Visitor use in the Reserve may cause an increase in corvid species, which are attracted by human food wastes and may then prey on nesting murrelets. As discussed in chapters 3 and 4, nest predation may be the primary cause of nest failure and depressed reproductive rates in the marbled murrelet (Singer et al. 1998, Marzluff and Balda 1997, U.S. Fish and Wildlife Service 1997). Picnic sites will be located in the Elk River corridor, which is relatively distant from the old-growth groves. Nevertheless, corvids attracted to the corridor for feeding would be able to easily probe into the central portions of the Reserve. To the degree that behavior of hikers cannot be controlled, the discarding of food wastes at any location along the trails system must be anticipated. Under some alternatives, these trails are within or adjacent to suitable and occupied

marbled murrelet habitat. This impact might be reduced through the seasonal and camping closures of trail systems adjacent to marbled murrelet habitat, but it is postulated that corvids develop affinity for the trail network during periods when the trails are open and will return during the closure periods. There may be some unquantified, unmitigated adverse impacts.

Effects on Northern Spotted Owl

Suitable habitat for the northern spotted owl would not be directly altered as a result of recreation activities. New trails will not displace nesting, and trail construction will be undertaken outside of the nesting season.

The potential for human activity to disturb nesting owls will be minimized through use of implementation guidelines given in chapter 4. There may be some unquantified, unmitigated adverse impacts.

Effects on Bald Eagle, Peregrine Falcon, and Osprey

Suitable habitat for these birds would not be altered or degraded as a result of trail development or use. New trails will not displace nesting, and trail construction will be undertaken outside of the nesting season. These birds, very few in number historically, can use portions of the Reserve that are distant from trails for nesting or roosting.

Effects on Amphibians, Reptiles, and Survey-and-Manage Species

These species, described in chapter 3, could be affected by the construction of stream trail crossings. New trails will not destroy any such species. If they are encountered, these species would be temporarily relocated if considered feasible by a qualified habitat specialist. Over the long-term, new trails to be constructed under several alternatives would contribute additional sediment to streams, which may adversely affect amphibian habitat.

Relative Effects of the Recreation Alternatives

Alternatives for Availability of Southern Access

Unescorted southern access to Reserve trails (Alternative 3A) could result in off-trail hiking (including entry into old-growth groves), violations of seasonal and camping closures to protect nesting murrelets and spotted owls, discarding of food wastes that may attract corvids, possession of firearms, hunting, fishing, and entry by dogs. Currently, and under alternative 3B, these potential impacts are avoided because visitors are accompanied by rangers who oversee visitor activities and educate visitors about these types of impacts. Alternative 3A would require that a significant enforcement program be initiated from the southern trailheads, similar to that now provided from the northern trailhead. Impacts to wildlife would occur, however, because total enforcement of restrictions to prevent these types of impacts is impossible, given the area involved. These potential impacts are considered significant.

Alternative 3C would not provide for public access to the southern portion of the Reserve. This alternative would benefit wildlife resources in comparison to the existing management scheme. The absence of human entry would enlarge habitat for species sensitive to human presence and

preclude any of the impacts described above. Thus, the no-southern-access alternative would result in a preserve-like habitat throughout the southern portion of the Reserve.

Alternatives for Extent of Trail System

Trails in the Reserve would pose two unavoidable significant impacts: dispersed human consumption of food that will at times be accompanied by discarding of food wastes that attract corvid and human noise disturbance to areas immediately surrounding trails. These potential impacts are related to the extent of the selected trail system, primarily those portions within the old-growth groves, but, in terms of noise disturbance, along other trail segments as well. As previously noted, USFWS considers that the zone of potential disturbance to marbled murrelets and spotted owls caused by trails generally extends 0.25 mile beyond the trails (USFWS 2000). Also as previously noted, disturbance to many other nesting birds extends up to 250 feet from the trails. The latter may be assumed to represent the zone of general wildlife disturbance caused by trails.

Extensive Access Alternative

Alternative 4A proposes access to nine trails (table 5-2), directly impacting 12 acres (or more, if wider trails are constructed for equestrian or bicycle uses) and indirectly impacting general wildlife over approximately 990 acres, or 13.4%, of the Reserve (table 6-6). Seven of these trails would be newly constructed trails in areas where no trails currently exist. Two north-south connecting trails would be constructed, which would pass through the central old-growth grove of the Reserve (figure 5-1). The historic Military Ridge Trail would traverse the center of the largest grove of old-growth forest in the Reserve, passing through it for 2.4 miles. The Western Periphery Trail would pass through a much shorter portion and be located near the edge of the grove. To accommodate traversing the long lengths of the north-south connecting trails, camping would need to be allowed at a specified site outside of, but near to, the old-growth groves.

This alternative poses several significant risks to special-status and other wildlife species associated with this alternative. Overnight camping would require development of additional infrastructure and administrative access. Overnight camping would also greatly increase the potential for human food availability to corvids, potentially facilitating predation on nesting murrelets. As previously noted, use closures in the breeding season would only partially reduce this effect. Because it would be difficult to monitor and enforce regulations along the north-south connecting trails, especially the historic Military Ridge Trail, the risk of off-trail hiking or on-trail hiking during night hours would increase. Murrelets or other wildlife intolerant of human disturbance would be adversely affected (figure 6-1). In addition, the risk of fire ignition would be greatly increased because of both the provision of overnight occupancy and the dispersal of visitors over large areas of the Reserve. The potential impacts of Alternative 4A are considered significant.

Limited Access Alternative

Alternative 4B proposes access to six trails, directly impacting seven acres and indirectly impacting general wildlife over 555 acres, or 7.5%, of the Reserve. Four of these trails would be newly constructed trails in areas where no trails currently exist. Under this alternative, only the Universal Access Trail and the loop at the upper end of the New Little South Fork Trail would enter old-growth habitat. The former is within 0.25 mile of a marbled murrelet site; therefore, it would be closed during the breeding season for this species. The group of existing and proposed Salmon Creek trails do not actually enter old-growth habitat but pass adjacent to it. Because they are also within 0.25 mile of occupied marbled murrelet habitat (figure 6-2), these trails would also be closed during the breeding season.

In disallowing north-south connecting trails, alternative 4B would result in much less potential for impacts on wildlife, as described above, compared to Alternative 4A. However, in comparison to current conditions, this alternative increases the general wildlife disturbance zone from 4.9% to 7.5% of the Reserve.

Maximum Preservation Alternative

Alternative 4C proposes access to one trail—the Elk River Corridor Trail—directly impacting two acres and indirectly impacting general wildlife over approximately 180 acres, or 1.9%, of the Reserve. This alternative reduces impacts on wildlife relative to the existing access alternative (4D). Under this alternative the only trail available for public use would be the Elk River Corridor Trail passing through second-growth forest and riparian habitat. No access would be provided to or near any of the old-growth groves of the Reserve (either from the north or the south). Illegal off-trail hiking to reach old-growth groves would be very arduous after road removals and revegetation actions were complete. This alternative would provide a relative benefit to old-growth-dependent species by eliminating the possibility of impacts to nesting owls and murrelets, preventing direct or noise disturbance to old-growth habitats, reducing opportunities for corvid intrusions, and greatly minimizing the risk of fire ignition.

Existing Access Alternative

Alternative 4D (no action) would continue to provide access to three trails, directly impacting 5.5 acres and indirectly impacting general wildlife over 460 acres, or 4.9%, of the Reserve. All of these trails would continue to be open in the daytime during the marbled murrelet breeding season, possibly subject to morning and evening closures that have yet to be determined. The Little South Fork Elk River Trail ends near the northern border of the central old-growth grove. The Salmon Creek Trail passes near the border of the same grove. Both locations are within 0.25 mile of occupied marbled murrelet habitat (figure 6-3). Impacts would continue to be minimized by prohibiting overnight camping and employing backcountry rangers to enforce restrictions.

Alternatives for Bicycle Use

Although it is unlikely, bicycle use within the Reserve has the potential to suddenly disturb, injure, or kill wildlife. However, scientific studies have not been found that address the potential for bicycle use to impact wildlife. Wildlife effects have been cited by managers of Mount Tamalpais State Park as a concern in bicycle-use management at that site (May pers. comm.).





Alternative 5A would allow bicycle use on the relatively steep Salmon Creek Trail, where this potential impact would be greatest. Alternative 5B would allow bicycle use along the relatively gently sloping Elk River Corridor Trail. Alternative 5C would ensure the least amount of disturbance to wildlife by not allowing bicycle use within the boundaries of the Reserve. In the absence of evidence that bicycle conflicts with wildlife have been significant, none of these alternatives is considered to result in a significant adverse effect on wildlife.

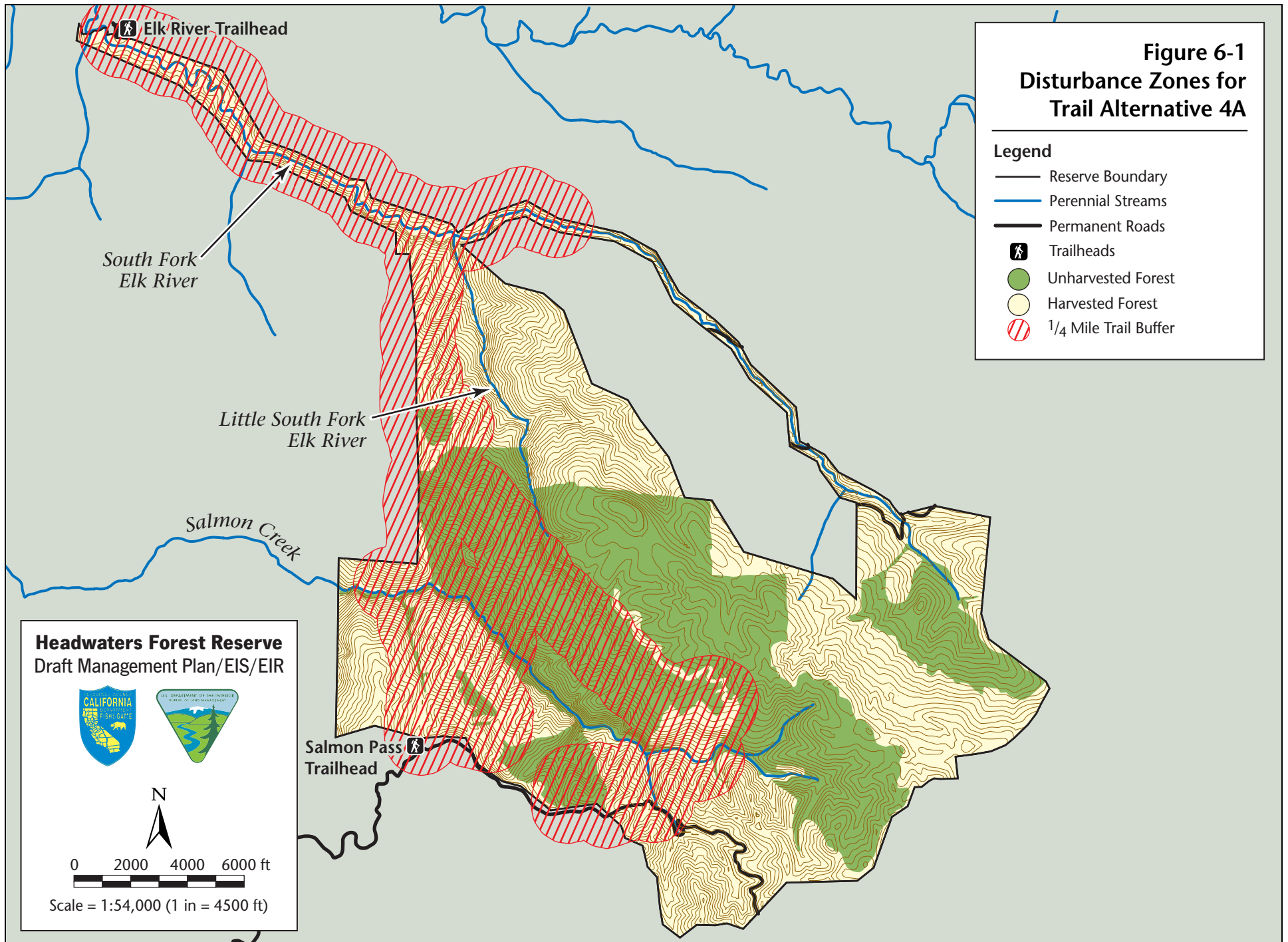
Alternatives for Equestrian Use

Impacts on wildlife resulting from equestrian use within the Reserve include the potential for horses to disturb wildlife, horse feces to transmit diseases to wildlife, and increased sedimentation in streams. The latter was discussed in the section above, “Effects of Recreation Management on Aquatic Ecosystems.”

Figure 6-1
Disturbance Zones for
Trail Alternative 4A

Legend

- Reserve Boundary
- Perennial Streams
- Permanent Roads
-  Trailheads
-  Unharvested Forest
-  Harvested Forest
-  1/4 Mile Trail Buffer



Headwaters Forest Reserve
Draft Management Plan/EIS/EIR



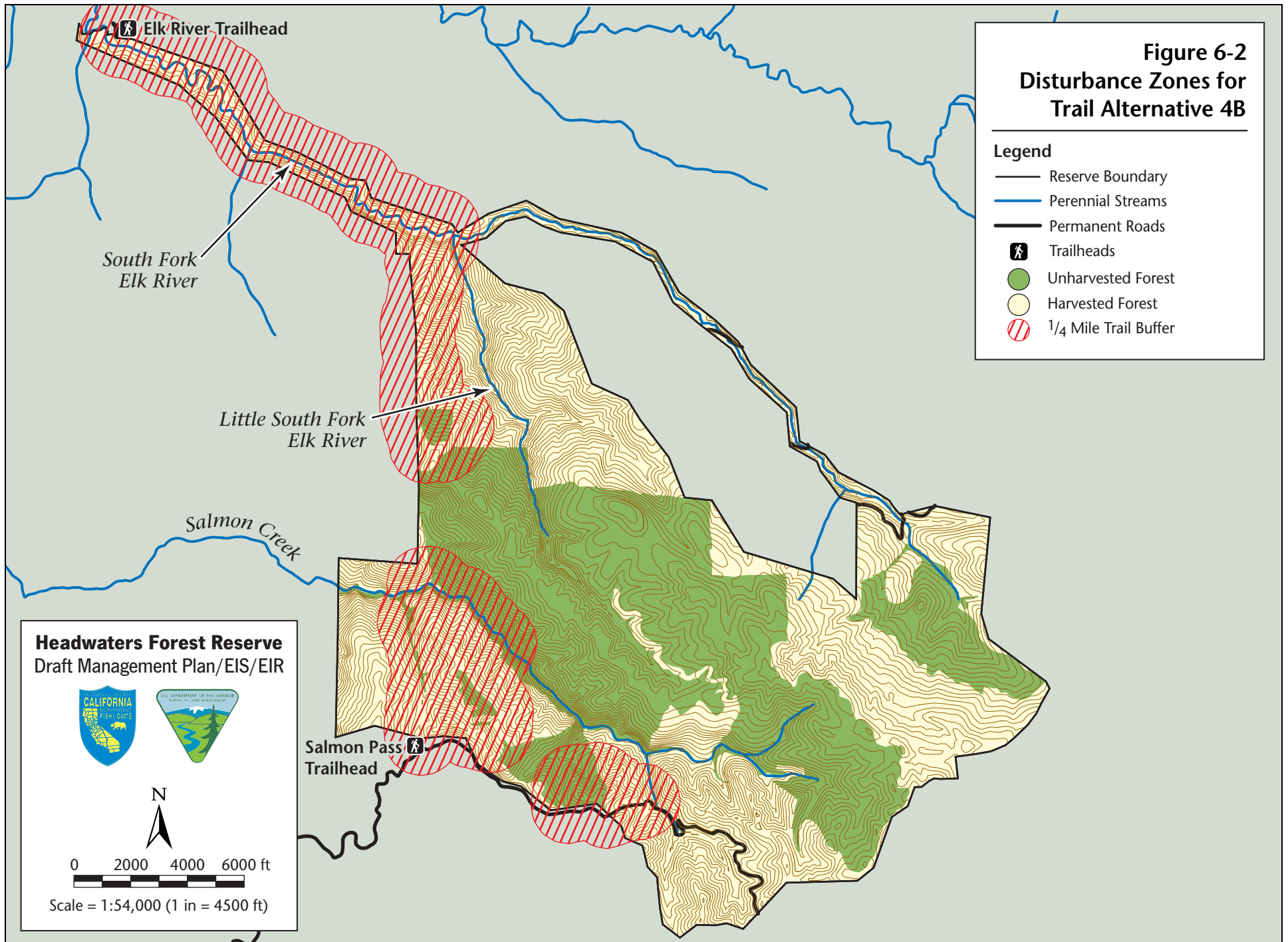
0 2000 4000 6000 ft

Scale = 1:54,000 (1 in = 4500 ft)

Figure 6-2
Disturbance Zones for
Trail Alternative 4B

Legend

- Reserve Boundary
- Perennial Streams
- Permanent Roads
- Trailheads
- Unharvested Forest
- Harvested Forest
- 1/4 Mile Trail Buffer



Headwaters Forest Reserve
Draft Management Plan/EIS/EIR







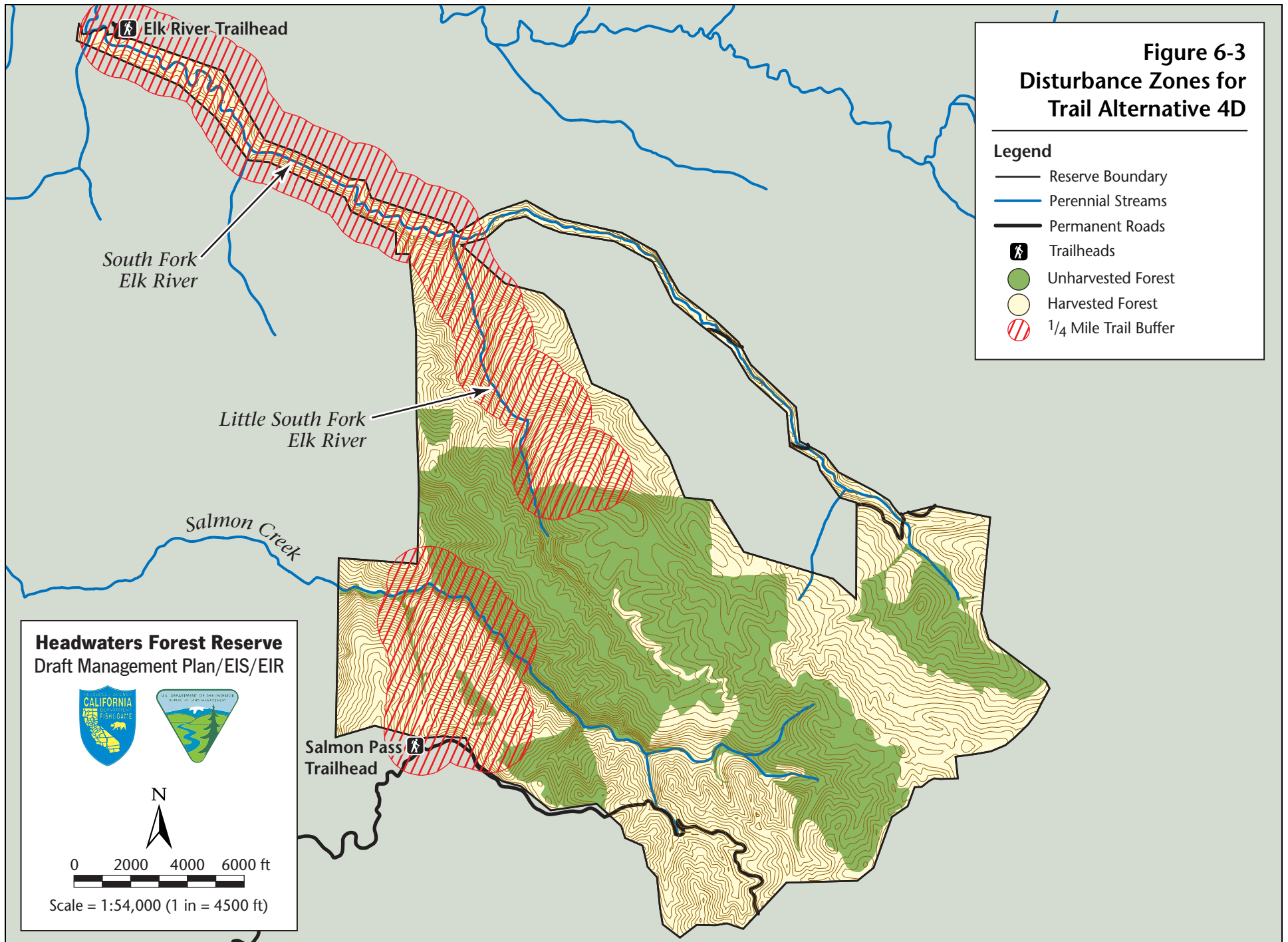
0 2000 4000 6000 ft

Scale = 1:54,000 (1 in = 4500 ft)

Figure 6-3
Disturbance Zones for
Trail Alternative 4D

Legend

- Reserve Boundary
- Perennial Streams
- Permanent Roads
-  Trailheads
-  Unharvested Forest
-  Harvested Forest
-  1/4 Mile Trail Buffer



Scientific studies have not been found that address the potential for horses to disturb wildlife or transmit disease to wildlife. There are a few studies on the potential for horses to transmit diseases to humans and some professional opinions on the potential for horses to transmit diseases to wildlife.

Equestrians have suggested that horses may be less disturbing to wildlife than hikers; however, this argument is supported through anecdotal evidence only. In the absence of contrary evidence, it is assumed that equestrian use poses no additional threats to wildlife than pedestrians.

Most research on wildlife disease examines the potential for wildlife to transmit disease to humans. Intensive studies on commercial livestock have identified a number of microorganisms, including *Cryptosporidium parvum*, *Giardia duodenalis*, *Campylobacter* ssp., *Salmonella* ssp., and pathogenic strains of *E. coli* and *Yersinia* ssp., in horse intestines (Quinn 1998). Correspondence with veterinarians and microbiologists at the University of California, Davis, indicates that the presence of these pathogens in horses is extremely rare, and there is little evidence that these pathogens can be spread through feces to humans (Baker pers. comm., Quinn 1998).

The organisms that horses could potentially transmit to wildlife include some of the intestinal strongyle parasites, the liver fluke *Fasciola hepatica*, the lung worm *Dictyocaulus arnfieldi*, various species of lice, and the parasitic mites *Psoroptes* and *Chorioptes* (Teglas pers. comm.). If horses are dewormed regularly, receive adequate veterinary care, are watered by nonpermanent sources separated from aquatic habitats, and pastured on dry land, the risk of transmission of these parasites to wildlife would be minimized. Actions to achieve measures described in the implementation guidelines for equestrian use in chapter 4 will be implemented at the Reserve.

Other than increased potential for sedimentation of streams caused by trail wear, discussed in “Aquatic Ecosystem” above, introduction of equestrian use into the Reserve would not be expected to have a significant adverse effect.

Effects of Recreation Management on Cultural Resources

The recreation program will indirectly benefit the Reserve’s cultural resources by committing financial resources to deriving information about the Reserve’s prehistoric and historic uses and fostering public support for protection, evaluation, and interpretation of these resources.

Potential Direct Adverse Effects

Potential direct adverse effects include disturbance of undiscovered resources during development of recreation facilities, including new trails (under three of four alternatives), new trailheads, expanded trailhead parking areas (to accommodate equestrians under two alternatives), and picnic sites and a pavilion in the Elk River corridor. Disturbance could also result from installation of interpretive signs and fences at known cultural resource sites.

Plans for siting trails and other facilities will be developed in consideration of the detailed information provided in the cultural resources survey (Humboldt State University Academic Foundation 2001). Ground disturbance near any of the identified sites will be avoided. Moreover, before trails or any other improvements are constructed at the Reserve, planned work areas will be surveyed for cultural resources, and if any are encountered, the project will be

appropriately modified based on evaluation by a qualified archaeologist. If any cultural materials or sites are encountered during construction, all work will be stopped until a qualified archaeologist has evaluated the find. Based on these protocols, potential direct impacts on cultural resources from the recreation program are considered less than significant.

Potential Indirect Adverse Effects

Members of the public are showing interest in the Reserve's cultural resources by incidentally and intentionally collecting and looting artifacts. Expanding public use of the Reserve would tend to magnify this continuing adverse indirect effect. For the most part, these types of impacts will be controlled and, hopefully, eliminated by proposed protection measures described in chapter 4. Those measures include collection by qualified archaeologists, fencing, signing, and providing security patrol and public outreach. It is feasible to provide an adequate level of patrol and public contact in the 2.6-mile Elk River corridor where most of the resources are situated.

Patrol and public contact to protect the prehistoric site would be difficult for the trail-extent alternative that allows public use of the historic military ridge trail (4A). The site is adjacent to the trail in a remote part of the Reserve, where it would be time-consuming and costly to provide a security patrol. Ironically, alternative 4A might provide a benefit to the historic trail itself, because keeping an old trail in use has the potential to preserve it better than another approach. However, this benefit of continuing use may be better provided by resource monitors and researchers who use this trail for access to study sites in the old-growth grove. Regardless, the potential for unpreventable damage to the prehistoric site, until the site can be collected or its significance determined, is considered a potential adverse effect of Alternative 4A.

Socioeconomic Effects of Recreation Management

Effects of Management Common to All Access Alternatives

Recreation will provide Reserve visitors the social, spiritual, and intellectual benefit of increased knowledge of old-growth resources and functions.

Public road access to the northwestern end of the Reserve will continue to be provided by Humboldt County's Elk River Road. Reserve visitors using this route will continue to stimulate retail business in Eureka. Because Eureka is a large, regional commercial center, such a stimulus was not discernable with the opening of the Reserve and would not be expected to be discernable under any of the public access alternatives.

Under all alternatives, traffic along Elk River Road to the Reserve will continue and will vary in magnitude according to the alternatives selected. This traffic will continue to annoy or disturb some of the residents bordering the road, especially those whose occupancy predated creation of the Reserve. A decrease in safety of local residents has not occurred with creation of the Reserve, however, and would not be expected to develop under any alternatives. Standard traffic management measures would be taken by the county to alleviate any development of a safety hazard.

Seasonal and daily restrictions on trail use to protect nesting marbled murrelet and northern spotted owl and to protect trails from water damage will continue to cause predictable fluctuations in traffic flow and associated visitor impacts on local residents.

Relative Effects of the Access Alternatives

Alternatives 3A, 3B, 4A, 4B, and 4D would continue to provide southern Reserve access to the Salmon Pass Trailhead via Newburg and Felt Springs Roads. These alternatives would benefit retailers in the nearby community of Fortuna to a minor but perhaps discernable degree. Residents along Newburg Road would continue to be disturbed by traffic to the Reserve under all of these alternatives. Because the unescorted vehicle access alternative (3A) and the more extensive trail system alternatives (4A and 4B) would tend to increase visitation to the Reserve relative to existing conditions, local resident annoyances may increase under those alternatives. The magnitude of anticipated increases in visitation under these alternatives is relatively small. Traffic safety has not diminished on this road since the Reserve was opened, and traffic management measures are available to Humboldt County to preclude safety from diminishing with the increased levels of visitation that would be expected under any of the alternatives.

Alternatives accommodating bicycling or equestrian uses in the Reserve (5A, 5B, 6A, and 6B) would increase total visitation to the Reserve. The magnitude of the increases is difficult to predict but would be expected to be relatively small. The largest effect would be on the Elk River Road because all equestrians would use this access and annoyance to local residents may be further increased by the passage of trucks pulling horse trailers. Traffic safety would not be expected to significantly diminish, and, as previously noted, measures may be taken by Humboldt County to ameliorate any such effects. The inconvenience of increased and changed vehicle traffic caused by equestrian access will be small and is not considered to be a significant impact of the equestrian use alternatives.

Effects of Recreation on Fire Behavior and Management

Public visitation will affect ignition risk. This risk is largely a function of the extent of the trail system in forest types that are particularly flammable. An assessment of the synergistic effects of forest restoration alternatives and public access alternatives was previously discussed in “Forest Restoration, Effects on Fire Behavior and Management”. In that assessment, it was concluded that trail system Alternatives 4A and 4B would cause a significant increase in the exposure of highly flammable stands to public visitation, and, in the absence of forest restoration (Alternative 2C), this increase would be a significant impact of these alternatives.

Effects of Recreation on Resource Monitoring

Increased access to the Reserve will require a greater level of monitoring of trail conditions and impacts to biological resources. The proposed monitoring plan is given in chapter 4. Unescorted southern access, old-growth contact, and bicycle and equestrian uses permitted under Alternatives 3A, 4A, 4B, 5A, 5B, 6A, and 6B will all contribute to the need for increased monitoring of trail conditions and biological resources. These monitoring needs are not considered significant impacts of these alternatives.

Management of Designated Special Areas

The primary effect of special-area designation(s) would be to constrain allowable uses or management actions that might otherwise be allowed or undertaken. These constraints were

noted in “Alternatives for Special-Area Designations” in chapter 5. In this section, the management and environmental implications of each constraint are assessed.

Table 6-7 shows the four special-area designations that would constrain the management direction assessed in this plan as well as the constraints and environmental implications relative to proposed management of the Reserve common to all alternatives (described in chapter 4).

Wilderness Study Area

In WSAs, forest restoration can be allowed only if it is temporary in nature and creates no new surface disturbance. The only relevant exception to this rule is if the activity clearly protects or enhances wilderness values or is the minimum activity necessary to protect public health and safety in the use and enjoyment of the wilderness values (DOI BLM 1995b). The proposed forest restoration actions, which are intended to accelerate the recovery of old-growth characteristics in the Reserve’s second-growth forests over the long term, do not “clearly protect or enhance wilderness values” in the near term. However, by accelerating recovery of old-growth values, forest restoration actions will enhance wilderness values over time. This constraint, when applied to the WSA designation alternative, would reduce the extent of action of forest restoration Alternative 7A by different amounts, thereby affecting the degree of recovery of old-growth characteristics and reduction in fire hazard (table 6-7).

The alternative WSA designations would have no effect on proposed recreation, with one exception. Development of trail systems in WSAs is not precluded, nor is it required. The development of support facilities (e.g., parking areas, restrooms, trailheads, pavilion, picnic sites) under consideration would occur outside of either WSA designation considered. Hiking and equestrian uses of trails are not precluded. However, “no mechanical transport, which includes all motorized vehicles plus trail or mountain bikes, will be allowed on such (WSA) trails” (DOI BLM 1995b). In the case of the Reserve, bicycle use is being considered for only one trail inside of the more extensive WSA under consideration (Alternative 7A) and not anywhere in the less extensive WSA alternative (Alternative 7B). Thus, if the more extensive designation is selected, alternative 5A (allowing bicycle use on wider trails) would be precluded.

Wild and Scenic River

Wild and Scenic River designation would not impose any additional management requirements on the lands to be included that are not already part of the proposed management direction of this plan. The use of mechanical equipment for watershed restoration is acceptable because these activities will improve aquatic ecosystems by reducing the potential for landslides and surface erosion to contribute sediment to streams. Likewise, the accelerated development of mature forest cover would have long-term beneficial effects on water quality. Because tree and brush removal would be excluded from riparian zones, direct short-term effects on the stream environments would not occur.

Wild and Scenic River designation segments would also have no effect on recreation under consideration. Development of trails systems; trail use by hikers, bicyclists, or equestrians; and development of support facilities, such as parking areas, restrooms, trailheads, interpretive pavilions, and picnic sites, would not be precluded by designation.

Table 6-7. Constraints Imposed by Special-Area Designations and Their Implications

Special-Area Designation	Use Disallowed	Management and Environmental Implications	Management Alternatives Precluded
Wilderness Study Area (Alternatives 7A, 7B)	Forest restoration	With most extensive designation (Alternative 7A), forest restoration would be limited to early-successional stands in Elkhead Springs area, or about 25% of stands that would otherwise be treated (figure 5-2); joining of central and eastern old-growth groves could be accelerated, but expansion of old-growth in other directions would not be; substantial fire hazards would remain untreated ^a	2A or 2B in substantial areas
		With less extensive designation (Alternative 7B), all forest restoration under consideration could occur, except that high-fire-hazard pole stand intruding into central old-growth grove could not be treated (figure 5-2) ^b	None
	Bicycle use	Bicycle use of existing Salmon Creek Trail would be precluded under both designations (figure 5-2)	5A
Wild and Scenic River (Alternative 8A)	None other than those disallowed by the proposed plan	None	None
State of California Ecological Reserve (Alternative 9A)	Firearm possession ^b	Would provide legal authority to ban hunting from Reserve	None
	Camping ^b	Public camping is proposed only if north-south connecting trails were opened; this use and camping of researchers would be precluded by state ecological reserve designation; this designation would avoid the potential for camping to attract corvids that may prey on nesting marble murrelets	4A
	Campfires ^b	Would provide legal authority to ban campfires from Reserve, which would decrease the potential for wildfire ignition	None
	Swimming ^b	Would preclude water contact activities along Elk River corridor and elsewhere, which would probably provide minor or no benefit to aquatic habitats and species	None
	Aircraft or hovercraft ^b	Would provide the legal authority to ban overflights at Reserve, thereby enhancing Reserve suitability for nesting murrelets, owls, and other birds, as well as wildlife in general	None
Area of Critical Environmental Concern/ Research Nature Area	None other than those disallowed by the proposed plan	Highlights the Reserve resources for special management of critical values and encourages use as a research resource	None
^a Actual wilderness designation by Congress could make allowances for forest and watershed restoration within certain timeframes.			
^b These uses are normally precluded, but could be specifically allowed in the designation action of California Fish and Game Commission.			

State of California Ecological Reserve

As indicated on table 6-7, designation of a State of California Ecological Reserve (appendix I) could impose several limitations on activities that would not otherwise be precluded by this plan. These restrictions would tend to further protect ecological integrity (e.g., no possession of firearms, no camping, no campfires, no hovercraft or aircraft), but they might tend to suppress public visitation (no camping, no swimming). Prohibition of hovercraft or aircraft may also interfere with helicopter logging on adjacent timberlands or interfere with emergency fire suppression activities.

The effect of a no-camping restriction would only affect users of the north-south connecting trails under Alternative 4A, if that alternative were selected. Such a restriction would not be an adverse effect relative to the impact baseline because camping is not currently allowed in the Reserve.

It is impossible to estimate the effect of a no-swimming restriction, but streams in the Reserve do not provide particularly good swimming opportunities. The impact of this restriction is considered less than significant.

Effects of a no-aircraft restriction on fire suppression and commercial helicopter logging activity on adjoining lands could be significant. These potential adverse effects could be reduced to a less-than-significant level by specifically allowing these uses in some or all of the Reserve in the ecological reserve designation.

Resource Monitoring and Evaluation

The benefit of resource monitoring and evaluation is in providing a scientific database on which future management decisions may be based. This plan sets forth certain needed actions and allowable uses, and the effects of those actions and uses need to be assessed. Based on such observations, adaptive management may be pursued. Changes in management may be made to modify implementation of the plan direction, modify plan direction itself, or even modify plan goals/decisions. The latter two modifications would require a plan amendment or revision (chapter 1).

Effects of Resource Monitoring on Ecological Resources

Protocols for all resource monitoring will be designed to be as nonobtrusive on ecological resources as possible. In no circumstances will monitoring be allowed to disturb special-status nesting birds or other wildlife or plants or cause an increase in sediment yield. The potential for monitors to attract corvids into the Reserve will be minimized by implementation measures in chapter 4 (“Research Management, Research Overnight Occupancy Guidelines”). None of the monitoring activities shown on table 4-7 would have any adverse effect on the Reserve’s resources.

Effects of Monitoring on Visitation

Monitoring would not intrude on visitors, other than by requiring that visitors continue to register in log books at trailheads. If visitor surveys were used, they would be voluntary in nature and

require approval from Office of Management and Budget to ensure that they do not burden visitors.

Management Revenue

Effects Common to All Management Revenue Alternatives

Imposition of use fees of the magnitude under consideration (chapter 4) would not be expected to significantly affect levels of visitation, based on results of BLM's fee demonstration program to date (appendix D; chapter 3). Recent experience at Patrick's Point State Park suggests, however, that the level of the fee may influence the type of use (i.e., interpretative versus sport). One purpose of the recent statewide reduction in state park fees was to encourage more use by lower-income persons. It is possible that fees under consideration for the Reserve would result in a somewhat changed profile of users, but a significant shift from current visitor types would not be expected.

Establishment of various user fees would be intended to derive revenue in proportion to the relative costs of providing access to the various user groups (e.g., equestrians and bicyclists require widened trails, greater trail maintenance, adequate parking facilities, additional law enforcement, development of watering sources [equestrians only]).

Relative Effects of the Management Revenue Alternatives

Fees would be charged to all visitors (Alternative 10A), only those participating in recreation tours (Alternative 10B), or those *not* participating in such tours (Alternative 10C). As noted above, any of these fee schemes would not be expected to significantly affect the magnitude and type of use of the Reserve.

A no-tour fee (Alternative 10C) would be a mild incentive to visitors to participate in guided tours rather than enter the Reserve individually and unaware of the possible implications of their visit. This approach has the benefit of increasing the number of visitors who can be taught the hazards of human behavior (e.g., discarding food scraps, hiking off-trail, disturbing nesting) on the ecosystem integrity of the Reserve. Also, the reduced level of individual use eases monitoring of visitor compliance with seasonal and hourly closures for marbled murrelet and spotted owl nesting.

A tour fee (Alternative 10B) would provide a source of revenue directly from the beneficiaries. It would not be expected to have environmental consequences.

Chapter 7. References Cited

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Appendix A. U.S. Fish and Wildlife Service Species List

Appendix A. U.S. Fish and Wildlife Service Species List

Table A-1. Listed/Proposed Threatened and Endangered Species for McWhinney Creek, Iaqua Buttes, Owl Creek, Hydesville, Fortuna, and Fields Landing Quadrangles (Candidates Included)

Type	Scientific Name	Common Name	Category	Critical Habitat
Plants	<i>Thlaspi montanum</i> var. <i>californicum</i>	Kneeland Prairie penny-cress	E	No
	<i>Lilium occidentale</i>	Western lily	E	No
	<i>Layia carnosa</i>	Beach layia	E	No
Fish	<i>Eucyclogobius newberryi</i>	Tidewater goby	E	Yes
	* <i>Oncorhynchus mykiss</i>	Northern California steelhead	T	No
	* <i>Oncorhynchus kisutch</i>	Southern Oregon/Northern California coho salmon	T	Yes
	* <i>Oncorhynchus tshawytscha</i>	California coastal chinook salmon	T	Yes
Birds	<i>Pelecanus occidentalis californicus</i>	California brown pelican	E	No
	<i>Charadrius alexandrinus nivosus</i>	Western snowy plover	T	Yes
	<i>Strix occidentalis caurina</i>	Northern spotted owl	T	Yes
	<i>Brachyramphus marmoratus</i>	Marbled Murrelet	T	Yes
	<i>Haliaeetus leucocephalus</i>	Bald eagle	T	No

Notes: (PE) Proposed Endangered = Proposed in the Federal Register as being in danger of extinction
 (PT) Proposed Threatened = Proposed as likely to become endangered within the foreseeable future
 (E) Endangered = Listed in the Federal Register as being in danger of extinction
 (T) Threatened = Listed as likely to become endangered within the foreseeable future
 (C) Candidate = Candidate which may become a proposed species
 Critical Habitat: Y = Designated, P = Proposed, N = None Designated

* Denotes a species listed by the National Marine Fisheries Service

Source: Greg Goldsmith, U.S. Fish and Wildlife Service.

Appendix B. Applicable Management Guidelines from the Northwest Forest Plan

Appendix B. Applicable Management Guidelines from the Northwest Forest Plan

This appendix contains two parts of the Northwest Forest Plan that are applicable to management of the Headwaters Forest Reserve:

- A. Standards and guidelines for Survey-and-Manage and certain other wildlife species
- B. Aquatic conservation strategy

A. Standards and Guidelines

for

Survey and Manage, Certain Cavity-nesting Birds, Canada Lynx, Some Bat Roosts and Management Recommendations for Certain Cavity-Nesting Birds and Some Bat Roosts

All sections of this document except the Management Recommendations for certain cavity nesting birds and some bat roosts, are the complete compilation of standards and guidelines.

I. Introduction

Existing Standards and Guidelines Are Amended

The standards and guidelines in the April 13, 1994 Northwest Forest Plan Record of Decision for Survey and Manage, Protection Buffers, Protect Sites From Grazing, Manage Recreation Areas to Minimize Disturbance to Species, and Provide Additional Protection for Caves, Mines, and Abandoned Wooden Bridges and Buildings That Are Used as Roost Sites for Bats (hereafter referred to as Survey and Manage and related mitigation measures) are removed in their entirety and replaced as described below. See Appendix B of the November 2000 *FSEIS for Amendment to the Survey and Manage, Protection Buffers, and other Mitigating Measures* for a complete display of the standards and guidelines to be removed. Except for certain cavity-nesting birds and Canada lynx described below, all former Protect Sites from Grazing species and Protection Buffer species are now either Survey and Manage species as described in the standards and guidelines below, or are removed from these standards and guidelines because they do not meet the Survey and Manage basic criteria. Known sites are managed as specified for the category to which they are placed, but the land allocations associated with Protection Buffer species sites (unmapped Late-Successional Reserves and Managed Late-Successional Areas) are returned to their underlying or appropriate surrounding allocation.

Other elements of the Northwest Forest Plan not specifically addressed, and implementation memos and other policy interpretations not affected by changes in these standards and guidelines, are not changed. Exceptions to certain standards and guidelines for research or the Adaptive Management Process described in Chapter E of the Northwest Forest Plan Standards and Guidelines, for example, continue to apply to Survey and Manage as under the Northwest Forest Plan Record of Decision.

Figure 1. Physiographic Provinces

Survey and Manage and other Mitigation Measures

Physiographic Provinces

The 1994 Northwest Forest Plan Standards and Guidelines includes two different province maps; physiographic provinces and planning provinces. The map of the 12 physiographic provinces appears on page A-3 of the Northwest Forest Plan Standards and Guidelines and is repeated here for reference (see Figure 1 - Physiographic Provinces). The physiographic provinces allow differentiation between areas of common biological and physical processes. Unless otherwise identified, references to “provinces” in these standards and guidelines are to physiographic provinces. The 12 physiographic provinces are:

- | | |
|-------------------------|-------------------------|
| 1. WA Olympic Peninsula | 7. OR Coast Range |
| 2. WA Western Lowlands | 8. OR Willamette Valley |
| 3. WA Western Cascades | 9. OR Klamath |
| 4. WA Eastern Cascades | 10. CA Klamath |
| 5. OR Western Cascades | 11. CA Coast Range |
| 6. OR Eastern Cascades | 12. CA Cascades |

Species Removed from Survey and Manage and other Standards and Guidelines

Species formerly included on Survey and Manage or related mitigation measures that are removed only because they are not closely associated with late-successional or old-growth forests (see Table 1-2) are already on, or are being considered for, the Agencies’ special status species programs. Known sites for these species will be managed until their disposition is clarified under the special status species programs or a decision is documented not to include them. For all other species removed from Survey and Manage or related mitigation measure, current “known sites” of these species are released for other resource activities.

Arthropod Guilds

For arthropods, references in these standards and guidelines to species or taxa apply only to these four functional groups, and no individual species will be added to Survey and Manage.

Land Allocations

These standards and guidelines apply to all land allocations.

II. Survey and Manage Basic Criteria

The Survey and Manage three basic criteria (see box) must be met for a species to be included in the Survey and Manage Standards and Guidelines. Species no longer meeting these criteria will be removed from Survey and Manage. The process for adding or removing a species is described in the Adaptive Management section. The following section describes “persistence” and the criteria used to determine when there is concern for persistence.

Three Basic Criteria for Survey and Manage

1. The species must occur within the Northwest Forest Plan area, or occur close to the NFP area and have potentially suitable habitat within the NFP area.
2. The species must be closely associated with late-successional or old-growth forest (see Exhibit A).
3. The reserve system and other Standards and Guidelines of the Northwest Forest Plan do not appear to provide for a reasonable assurance of species persistence.

Species Persistence Objectives

For purposes of these standards and guidelines, species persistence objectives have been adapted from the Northwest Forest Plan ROD (page 44). In general, these objectives may be described as providing for roughly the same likelihood of persistence as that which was provided by the Northwest Forest Plan as originally adopted in the 1994 ROD. More particularly, for vertebrate species, the Northwest Forest Plan specified use of the Forest Service viability provision in the National Forest System Land and Resource Management Planning Regulation for the National Forest Management Act of 1976, which reads in part as follows:

“Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.” (36 CFR 219.19.)

The 1994 ROD identified compliance with this Forest Service regulation as a goal across both Forest Service and BLM administered lands as a means of serving the important policy goal of protecting the long-term health and sustainability of all of the federal forests within the range of the northern spotted owl and the species that inhabit them (page 44). The Northwest Forest Plan ROD takes note of the fact that there is no specific or precise standard or technique for satisfying the viability provision (page 44), nor is there any requirement to conduct a viability analysis for each.

Survey and Manage and other Mitigation Measures

species. Instead, common sense and agency expertise must be used in making determinations of compliance with the viability provision (Seattle Audubon Society v. Moseley (W.D. Wash. 1992)). For non-vertebrate species, the Northwest Forest Plan satisfied “a similar standard (to the one reflected in the NFMA viability provision for vertebrate species) . . . to the extent practicable” (page 44). These overall objectives are summarized simply as the “persistence objectives” for these standards and guidelines.

As part of the background to the Northwest Forest Plan, the FEMAT report provided assessment of the effects of various management options on species associated with late-successional and old-growth forests. This assessment was based on expert panel evaluation of the likelihood that each option presented in the FEMAT report would provide sufficient habitat on federally managed lands for various distribution patterns of species populations for 100 years. This assessment was documented in the Northwest Forest Plan Draft SEIS. Between the Draft SEIS and the Final SEIS for the Northwest Forest Plan, additional analysis was done for those species whose original outcomes were potentially inconsistent with the stated species persistence objectives. This additional analysis identified Survey and Manage as one mitigation measure that could improve the likelihood of meeting species persistence objectives, particularly for rare species and those about which little is known. Survey and Manage, along with other mitigation measures, was adopted in the ROD. These mitigation measures, along with the assessment of outcomes by panels of experts, were among the factors the signers of the ROD used to determine that species objectives, including those directed by the National Forest Management Act regulations, were met (see Northwest Forest Plan ROD, pages 43 to 47). This determination was upheld by the courts.

For the November 2000 Survey and Manage FSEIS, expert effects writers again used outcome statements as part of their assessment process. These outcome statements were modified from those used by FEMAT to better fit typical Survey and Manage species (rare or endemic species or species about which little is known).

Objectives for maintaining species persistence for these standards and guidelines are the same as those described in the Northwest Forest Plan ROD. The objectives recognize that there is uncertainty associated with the continued persistence of species. Even absent any human-induced effects, the likelihood that habitat will continue to support species’ persistence can vary among species. For example, the continued persistence of rare species, whose entire range may comprise only a few acres, is inherently at greater risk due to natural disturbance than species with larger ranges and more locations, when considered over the long term. Thus, the achievement of species persistence is not subject to precise numerical interpretation and cannot be fixed at any one single threshold (see Northwest Forest Plan ROD, page 44).

In general, these standards and guidelines are designed to help the Northwest Forest Plan provide for the persistence of late-successional and old-growth forest related species.

Concern for Persistence

One of the basic criteria for applying the Survey and Manage mitigation to a species is concern for persistence. A **concern for persistence** exists when the reserve system and other standards and guidelines of the Northwest Forest Plan do not appear to provide a reasonable assurance of species persistence. **Little or no concern for persistence** exists when the reserve system and other standards and guidelines of the Northwest Forest Plan (other than Survey and Manage) provide a reasonable assurance of persistence. When this assurance of species persistence exists, the species may be removed from Survey and Manage.

Criteria Indicating a Concern for Persistence: One or more of the following criteria, which are to be considered in the context of the reserve system and other standards and guidelines of the Northwest Forest Plan, may indicate a concern for species persistence. These criteria must be considered aside from the Survey and Manage provisions, and must apply within the Northwest Forest Plan area.

- Low-to-moderate number of likely extant known sites/records in all or part of a species range.
- Low-to-moderate number of individuals.
- Low-to-moderate number of individuals at most sites or in most populations.
- Very-limited to somewhat-limited range.
- Very-limited to somewhat-limited habitat.
- Distribution within habitat is spotty or unpredictable in at least part of its range.

Criteria Indicating Little or No Concern for Persistence: Usually, most of the following criteria need to be met to indicate that a concern for persistence does not exist. These criteria must apply within the Northwest Forest Plan area.

- Moderate-to-high number of likely extant sites/records.
- High proportion of sites and habitat in reserve land allocations; or limited number of sites within reserves, but the proportion or amount of potential habitat within reserves is high and there is a high probability that the habitat is occupied.
- Sites are relatively well distributed within the species range.
- Matrix Standards and Guidelines or other elements of the Northwest Forest Plan provide a reasonable assurance of species persistence.

Concern for persistence is based on existing knowledge and, therefore, may change over time. While concern will remain for some species that are truly rare, the concern for many species will be alleviated as more information is accumulated through pre-disturbance and strategic surveys, and considered with the criteria indicated above. A species for which there is no longer a concern for persistence will be removed from Survey and Manage as described in the adaptive management section.

Relative Rarity

The standards and guidelines subdivide species for which there is a concern for persistence by their relative rarity, as either “rare” or “uncommon.” The relative rarity subdivision is based on such factors as numbers of populations, distribution, commonality of habitat, population trends, numbers of individuals, and so forth. Placement of species in management categories depends largely on their relative rarity as described below. Management directions for “rare” and “uncommon” species are not the same, because relative rarity changes the level of concern and, therefore, the management needed to provide for a reasonable assurance of persistence. Like concern for persistence, this subdivision is based on current knowledge and is changeable.

A determination that a species is “rare” is based on a combination of information, as described in the criteria for each category. A species may be rare if it has: (1) limited distribution; (2) a low number of sites or individuals per site; (3) highly specialized habitat requirements; (4) declining habitat or population trends; (5) reproductive characteristics that limit population growth rates; (6) restricted distribution pattern relative to range or potential habitat; and/or, (7) narrow ecological amplitude.

A determination that a species is “uncommon” is based on information that indicates a species may have: (1) more widespread distribution; (2) higher number of sites; (3) low-to-high number of individuals per site; (4) more stable populations or habitats; (5) less restricted distribution pattern relative to range or potential habitat; and, (6) moderate-to-broad ecological amplitude (see criteria under each category, later in this chapter).

III. Survey and Manage Categories

Introduction

These standards and guidelines are designed to provide approximately the same level of species protection as intended in the Northwest Forest Plan. Survey and Manage species are grouped into six categories (A-F) as shown below. The six categories are based on level of relative rarity, ability to reasonably and consistently locate occupied sites during surveys prior to habitat-disturbing activities, and the level of information known about the species or group of species.

The six categories help delineate species objectives and apply specific management direction, compared to the previous four Northwest Forest Plan categories, partly because each species is assigned to only one category for all or part of its range. The standards and guidelines describe the objective, assignment criteria, and management direction for each category.

The species included in Survey and Manage, and the category to which each species, or portion of the range of each species, is assigned, is shown on Table 1-1, Species Included in Survey and.

Survey and Manage Categories

Redefine Categories Based on Species Characteristics			
Relative Rarity	Pre-Disturbance Surveys Practical	Pre-Disturbance Surveys Not Practical	Status Undetermined
Rare	Category A - 57 species <ul style="list-style-type: none"> • Manage All Known Sites • Pre-Disturbance Surveys • Strategic Surveys 	Category B - 222 species <ul style="list-style-type: none"> • Manage All Known Sites • N/A • Strategic Surveys 	Category E - 22 species <ul style="list-style-type: none"> • Manage All Known Sites • N/A • Strategic Surveys
Uncommon	Category C - 10 species <ul style="list-style-type: none"> • Manage High-Priority Sites • Pre-Disturbance Surveys • Strategic Surveys 	Category D - 14 species ¹ <ul style="list-style-type: none"> • Manage High-Priority Sites • N/A • Strategic Surveys 	Category F - 21 species <ul style="list-style-type: none"> • N/A • N/A • Strategic Surveys

¹ Includes three species for which pre-disturbance surveys are not necessary

Manage Standards and Guidelines and Category Assignment. The adaptive management section of these standards and guidelines define how to change species among the six categories and how to add or remove species from Survey and Manage, in response to new information.

These standards and guidelines apply within all land allocations; however, the Survey and Manage provision for each species will be directed to the range (or portion of range) of that species, to the particular habitats where concerns exist for its persistence, and to the management activities considered “habitat-disturbing” for that species. The Survey and Manage Standards and Guidelines will benefit species closely associated with late-successional and old-growth forests including certain amphibians, birds, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod groups. Information about these species, acquired through application of these standards and guidelines, should facilitate project planning and adaptive-management changes.

The following text describes the six categories. The category discussions include additional information that clarifies the linkage between objectives and management actions of each category and describes the criteria for assigning species to the various categories. A taxon, or range-defined portion of a taxon, can be assigned to only one category.

Category A (Rare, Pre-Disturbance Surveys Practical)

Objective: Manage all known sites and minimize inadvertent loss of undiscovered sites.

Criteria for assigning a species to Category A are:

- The species is rare and all known sites or population areas are likely to be necessary to provide reasonable assurance of species persistence, as indicated by one or more of the following:

Survey and Manage and other Mitigation Measures

- < Low number of likely extant sites/records on federal lands indicates rarity.
- < Species poorly distributed within its range or habitat.
- < Limited number of individuals per site.
- < Highly specialized habitat requirements (narrow ecological amplitude).
- < Dispersal capability limited relative to federal habitat.
- < Microsite habitat limited.
- < Reproduction or survival not sufficient.
- < Low number of sites in reserves or low likelihood of sites or habitat in reserves.
- < Habitat fragmentation that causes genetic isolation.
- < Factors beyond management under the Northwest Forest Plan affect persistence, but special management under the Northwest Forest Plan will help persistence.
- < Declining habitat trend

and:

- Pre-disturbance surveys are practical.

Management Direction:

Manage All Known Sites: Current and future known sites will be managed according to the Management Recommendation for the species. Professional judgment, Appendix J2 in the Northwest Forest Plan Final SEIS, and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations. (See glossary for definition of “known site.”)

Professional judgment, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the REO.

Surveys Prior to Habitat-Disturbing Activities: Surveys will be conducted at the project level prior to habitat-disturbing activities, and in accordance with Survey Protocols, to avoid loss of undiscovered sites by habitat-disturbing activities. Species sites found as a result of these surveys will be managed as known sites.

Strategic Surveys: The objective of strategic surveys in this category is to search for additional sites and to characterize the habitat, improving the ability of the Agencies to know where to survey and how to manage the species. These surveys will build upon and incorporate information from previous and ongoing surveys. Species sites found as a result of these strategic surveys will be managed as known sites.

Strategic Surveys may address one or more of the following:

- Are known sites still extant?
- What is the habitat of the species?
- Identify high-probability habitat for surveys to find new sites.
- Where else does the species occur? Find new sites.

Survey and Manage Categories

- Collect habitat information to assist with managing the species.
- What is the status of the population (such as number of individuals, size)?
- What is the distribution of the species relative to the land allocations established in the Northwest Forest Plan?

Category B (Rare, Pre-Disturbance Surveys Not Practical)

Objective: Manage all known sites and reduce the inadvertent loss of undiscovered sites.

Criteria for assigning a species to Category B:

- Same criteria as Category A, except that pre-disturbance surveys are not practical.

Management Direction:

Manage All Known Sites: Same as Category A.

Strategic Surveys: The objective of strategic surveys in this category is to find additional new sites and to characterize the habitat, improving the ability of the Agencies to know where to survey and how to manage and conserve the species. To reduce the inadvertent loss of undiscovered sites, the Agencies will not sign NEPA decisions or decision documents for habitat-disturbing activities in old-growth forest (a sub-set of late-successional forest - see glossary) in fiscal year 2006 (fiscal year 2011 for fungi) and beyond, unless either:

- strategic surveys have been completed for the province that encompasses the project area, or
- equivalent-effort surveys have been conducted in the old-growth habitat to be disturbed.

Strategic surveys build upon and incorporate information from previous and ongoing surveys. Species sites found as a result of strategic surveys will be managed as known sites. Strategic survey accomplishments, including completion by province, will be summarized in the annual report. “Old growth” is specified in this standard and guideline to assure retention of what is assumed to be the highest quality potential habitat for Survey and Manage species until strategic surveys are completed or equivalent-effort surveys are conducted. “Province” is specified as the geographic unit in which to assess completion of strategic surveys given that it represents the smallest, logical, well-defined area for which the results of strategic surveys likely could be compiled, analyzed, and presented with meaningful results.

Strategic Surveys may address one or more of the following:

- Are known sites still extant?
- What is the habitat of the species?
- Identify high-probability habitat for surveys to find new sites.

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- Where else does the species occur? Survey high-probability habitat at highest risk to find new sites.
- What is the distribution of the species relative to the land allocations established in the Northwest Forest Plan?
- Collect habitat information to assist with managing the species.
- What is the status of the population (such as number of individuals, size)?

Category C (Uncommon, Pre-Disturbance Surveys Practical)

Objective: Identify and manage high-priority sites to provide for reasonable assurance of species persistence. Until high-priority sites can be determined, manage all known sites.

Criteria for assigning a species to Category C are:

- The species is uncommon, and not all known sites or population areas are likely to be necessary for reasonable assurance of persistence, as indicated by one or more of the following:
 - < A higher number of likely extant sites/records does not indicate rarity of the species.
 - < Low-to-high number of individuals per site.
 - < Less restricted distribution pattern relative to range or potential habitat.
 - < Moderate-to-broad ecological amplitude.
 - < Moderate-to-high likelihood of sites in reserves.

and,

- Pre-disturbance surveys are practical.

Management Direction:

Manage High-Priority Sites: High-priority sites will be managed according to the Management Recommendation for the species. Professional judgment, Appendix J2 in the Northwest Forest Plan Final SEIS, and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations. Until a Management Recommendation is written addressing high-priority sites, either assume all sites are high priority, or local determination (and project NEPA documentation) of non-high priority sites may be made on a case-by-case basis with: (1) guidance from the Interagency Survey and Manage Program Manager; (2) local interagency concurrence (BLM, FS, USFWS); (3) documented consideration of the condition of the species on other administrative units as identified by the Program Manager -typically adjacent units as well as others in the species range within the province; and, (4) identification in ISMS. The Survey and Manage Program Manager will involve appropriate taxa specialists.

Professional judgment, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional high-priority sites not needed for persistence. These exceptions will be reviewed by the REO.

Survey and Manage Categories

Surveys Prior to Habitat-Disturbing Activities: Surveys will be conducted at the project level prior to habitat-disturbing activities and in accordance with Survey Protocols. Sites found as a result of these surveys will be managed as described above under manage high-priority sites. Management Recommendations or Survey Protocols may specify habitats or conditions (e.g., seral stages) not needing surveys because “high-priority” sites are not expected to be found there.

Strategic Surveys: The objective of strategic surveys in this category is to gather information to either develop or revise Management Recommendations, which will include identifying high-priority sites for management and how to manage to provide for a reasonable assurance of species persistence. Strategic surveys build upon and incorporate information from previous and ongoing surveys. Sites found as a result of these surveys will be managed as described above under manage high-priority sites.

Strategic Surveys may address one or more of the following:

- What is the quality of the known sites (such as habitat characteristics, longevity and continuity of habitat, and the status and characteristics of the population)?
- What is the geographic distribution of sites and extent of the range of species within the area of the Northwest Forest Plan (such as distribution of sites in the Northwest Forest Plan reserve allocations and the connectivity of known sites, both spatially and temporally)?
- Where does the species occur? Find new high-priority sites.
- Obtain information on habitat requirements to help manage known sites (e.g., developing Management Recommendations and identifying high-priority sites).

Category D (Uncommon, Pre-Disturbance Surveys Not Practical or Not Necessary)

Objective: Identify and manage high-priority sites to provide for a reasonable assurance of species persistence. Until high-priority sites can be determined, manage all known sites.

Criteria for assigning a species to Category D:

- Same criteria as Category C, except that pre-disturbance surveys are not practical or are not necessary to meet objectives for species persistence because inadvertent loss of some undiscovered sites would not change level of rarity.

Some species for which pre-disturbance surveys are practical are placed in this category if there are a sufficient number of sites known to meet species objectives, and either Management Recommendations need to be written to define high-priority sites for management, or strategic surveys are needed to confirm distribution in reserves prior to future removal from Survey and Manage. These species are specifically identified on Table 1-1.

Survey and Manage and other Mitigation Measures

Management Direction:

Manage High-Priority Sites: Same as Category C.

Strategic Surveys: The objective of strategic surveys in this category is to gather information to either develop or revise Management Recommendations, which will include identifying high-priority sites for management and how to manage to provide for a reasonable assurance of species persistence. Strategic surveys build upon and incorporate information from previous and ongoing surveys. Sites found as a result of these surveys will be managed as described above under manage high-priority sites.

Strategic Surveys may address one or more of the following:

- What is the quality of known sites (such as habitat characteristics, longevity and continuity of habitat, and status and characteristics of population)?
- What is the geographic distribution of sites and extent of the species range within the area of the Northwest Forest Plan (such as distribution of sites in the Northwest Forest Plan reserve allocations and the connectivity of known sites, both spatially and temporally)?
- Where does the species occur? Find new high-priority sites.
- Obtain information on habitat requirements to help manage known sites (such as developing Management Recommendations and identifying high-priority sites).

Category E (Rare, Status Undetermined)

Objective: Manage all known sites while determining if the species meets the basic criteria for Survey and Manage and, if so, to which category (A, B, C, or D) it should be assigned.

Criteria for assigning a species to Category E:

- The number of likely extant sites/records and survey information on federal lands indicates possible rarity of the species; and
- Information is insufficient to determine whether Survey and Manage basic criteria are met or to determine what management is needed for a reasonable assurance of species persistence.

Management Direction:

Manage All Known Sites: Current and future known sites will be managed according to the Management Recommendation for the species. Professional judgment, Appendix J2 in the Northwest Forest Plan Final SEIS (USDA, USDI 1994a), and appropriate literature will be used to guide individual site management for those species that do not have Management Recommendations.

Survey and Manage Categories

Professional judgment, coupled with locally specific information and advice from taxa specialists about the species, may be used to identify occasional sites not needed for persistence. These exceptions will be reviewed by the REO.

Strategic Surveys: The objective of strategic surveys in this category is to collect enough information to determine if the species meets the basic criteria for Survey and Manage, and to either place the species into the appropriate Survey and Manage category or remove the species from Survey and Manage.

Strategic surveys build upon and incorporate information from previous and ongoing surveys. Species sites found as a result of these surveys will be managed as known sites. In cases where the strategic survey indicates that there is still a concern for persistence, but the species is not closely associated with late-successional or old-growth forests, the species will be removed from Survey and Manage and considered for the Agencies' special status species programs.

Strategic Surveys may address one or more of the following:

- Is the species closely associated with late-successional and old-growth forests?
 - < Revisit known sites, characterize the species habitat, and find new sites.
- Does the species occur within the Northwest Forest Plan area?
 - < Survey potential habitat near known sites.
- What is the appropriate management for the species?
 - < Does the species meet the basic criteria for Survey and Manage?
 - < What is the appropriate Survey and Manage category?

Category F (Uncommon or Concern for Persistence Unknown, Status Undetermined)

Objective: Determine if the species meets the basic criteria for Survey and Manage and, if so, to which category (A, B, C, or D) it should be assigned.

Criteria for assigning a species to Category F:

- The species is uncommon and the number of likely extant sites/records and survey information does not indicate rarity; and
- Information is insufficient to determine whether Survey and Manage basic criteria (including whether there is a concern for persistence) are met, or to determine what management is needed for reasonable assurance of species persistence.

Management Direction:

Manage known sites is NOT required for this category because species are uncommon, not rare, and species within this category will be assigned to other categories or removed from Survey and.

Survey and Manage and other Mitigation Measures

Manage as soon as new information indicates the correct placement. Until that time, inadvertent loss of some sites is not likely to change the level of rarity. Other management direction is yet to be determined.

Strategic Surveys: The objective of strategic surveys in this category is to collect enough information to determine if the species meets the basic criteria for Survey and Manage, and to either place the species into the appropriate Survey and Manage category or remove the species from Survey and Manage. These surveys will build upon and incorporate information from previous and ongoing surveys. In cases where the strategic survey indicates there is still a concern for persistence, but the species is not closely associated with late-successional or old-growth forests, the species will be removed from Survey and Manage and considered for the Agencies' special status species programs.

Strategic Surveys may address one or more of the following:

- Is the species closely associated with late-successional or old-growth forests?
- Does the species occur within the Northwest Forest Plan area?
- What is the appropriate management for the species?
 - < Does the species meet the basic criteria for Survey and Manage?
 - < What is the appropriate Survey and Manage category?
- What is the level of rarity?

B. Aquatic Conservation Strategy

The Aquatic Conservation Strategy was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The strategy would protect salmon and steelhead habitat on federal lands managed by the Forest Service and Bureau of Land Management within the range of Pacific Ocean anadromy.

This conservation strategy employs several tactics to approach the goal of maintaining the “natural” disturbance regime. Land use activities need to be limited or excluded in those parts of the watershed prone to instability. The distribution of land use activities, such as timber harvest or roads, must minimize increases in peak streamflows. Headwater riparian areas need to be protected, so that when debris slides and flows occur they contain coarse woody debris and boulders necessary for creating habitat farther downstream. Riparian areas along larger channels need protection to limit bank erosion, ensure an adequate and continuous supply of coarse woody debris to channels, and provide shade and microclimate protection. Watersheds currently containing the best habitat or those with the greatest potential for recovery should receive increased protection and receive highest priority for restoration programs.

Any species-specific strategy aimed at defining explicit standards for habitat elements would be insufficient for protecting even the targeted species. The Aquatic Conservation Strategy must strive to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century, to accomplish all of its objectives. Some improvements in aquatic ecosystems, however, can be expected in 10 to 20 years.

The important phrases in these standards and guidelines are “meet Aquatic Conservation Strategy objectives,” “does not retard or prevent attainment of Aquatic Conservation Strategy objectives,” and “attain Aquatic Conservation Strategy objectives.” These phrases, coupled with the phrase “maintain and restore” within each of the Aquatic Conservation Strategy objectives, define the context for agency review and implementation of management activities. Complying with the Aquatic Conservation Strategy objectives means that an agency must manage the riparian-dependent resources to maintain the existing condition or implement actions to restore conditions. The baseline from which to assess maintaining or restoring the condition is developed through a watershed analysis. Improvement relates to restoring biological and physical processes within their ranges of natural variability.

The standards and guidelines are designed to focus the review of proposed and certain existing projects to determine compatibility with the Aquatic Conservation Strategy objectives. The standards and guidelines focus on “meeting” and “not preventing attainment” of Aquatic Conservation Strategy objectives. The intent is to ensure that a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives. The decision maker will use the results of watershed analysis to support the finding. In order to make the finding that a project or management action “meets” or “does not prevent attainment” of the Aquatic Conservation Strategy objectives, the analysis must include a description of the existing condition, a description of the range of natural variability of the important physical and biological components of a given watershed, and how the proposed project or management action maintains the existing condition or moves it within the range of natural variability. Management actions that do not maintain the existing condition or lead to improved conditions in the long

term would not “meet” the intent of the Aquatic Conservation Strategy and thus, should not be implemented.

Aquatic Conservation Strategy Objectives

Forest Service and BLM-administered lands within the range of the northern spotted owl will be managed to:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Components of the Aquatic Conservation Strategy

1. **Riparian Reserves:** Lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use.
2. **Key Watersheds:** A system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water.
3. **Watershed Analysis:** Procedures for conducting analysis that evaluates geomorphic and ecologic processes operating in specific watersheds. This analysis should enable watershed planning that achieves Aquatic Conservation Strategy objectives. Watershed Analysis provides the basis for monitoring and restoration programs and the foundation from which Riparian Reserves can be delineated.
4. **Watershed Restoration:** A comprehensive, long-term program of watershed restoration to restore watershed health and aquatic ecosystems, including the habitats supporting fish and other aquatic and riparian-dependent organisms.

These components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. Late-Successional Reserves are also an important component of the Aquatic Conservation Strategy. The standards and guidelines under which Late-Successional Reserves are managed provide increased protection for all stream types. Because these reserves possess late-successional characteristics, they offer core areas of high quality stream habitat that will act as refugia and centers from which degraded areas can be recolonized as they recover. Streams in these reserves may be particularly important for endemic or locally distributed fish species and stocks.

1. Riparian Reserves

There are an estimated 2,627,500 acres of Riparian Reserves interspersed within the matrix. (Acres for matrix listed elsewhere in these standards and guidelines do not include Riparian Reserves.) Riparian Reserves and their appurtenant standards and guidelines also apply where these reserves overlap with any other land allocations. Acres of Riparian Reserves within other land allocations is not calculated, but is estimated to encompass 40 percent (based on a sample) of those allocations. The percent of area in Riparian Reserves varies markedly among administrative units, from a high of approximately 74 percent on the Siuslaw National Forest, to a low of approximately 4 percent on the Deschutes National Forest.

Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams,

stream processes, and fish habitats. Riparian Reserves include areas designated in current plans and draft plan preferred alternatives as riparian management areas or streamside management zones and primary source areas for wood and sediment such as unstable and potentially unstable areas in headwater areas and along streams. Riparian Reserves occur at the margins of standing and flowing water, intermittent stream channels and ephemeral ponds, and wetlands. Riparian Reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecologic processes.

Under the Aquatic Conservation Strategy, Riparian Reserves are used to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed. The Riparian Reserves will also serve as connectivity corridors among the Late-Successional Reserves.

Interim widths for Riparian Reserves necessary to meet Aquatic Conservation Strategy objectives for different waterbodies are established based on ecologic and geomorphic factors. These widths are designed to provide a high level of fish habitat and riparian protection until watershed and site analysis can be completed. Watershed analysis will identify critical hillslope, riparian, and channel processes that must be evaluated in order to delineate Riparian Reserves that assure protection of riparian and aquatic functions. Riparian Reserves are delineated during implementation of site-specific projects based on analysis of the critical hillslope, riparian, and channel processes and features. Although Riparian Reserve boundaries may be adjusted on permanently-flowing streams, the prescribed widths are considered to approximate those necessary for attaining Aquatic Conservation Strategy objectives. Post-watershed analysis Riparian Reserve boundaries for permanently-flowing streams should approximate the boundaries prescribed in these standards and guidelines. However, post-watershed analysis Riparian Reserve boundaries for intermittent streams may be different from the existing boundaries. The reason for the difference is the high variability of hydrologic, geomorphic and ecologic processes in a watershed affecting intermittent streams. At the same time, any analysis of Riparian Reserve widths must also consider the contribution of these reserves to other, including terrestrial, species. Watershed analysis should take into account all species that were intended to be benefited by the prescribed Riparian Reserve widths. Those species include fish, mollusks, amphibians, lichens, fungi, bryophytes, vascular plants, American marten, red tree voles, bats, marbled murrelets, and northern spotted owls. The specific issue for spotted owls is retention of adequate habitat conditions for dispersal.

The prescribed widths of Riparian Reserves apply to all watersheds until watershed analysis is completed, a site-specific analysis is conducted and described, and the rationale for final Riparian Reserve boundaries is presented through the appropriate NEPA decision-making process.

Riparian Reserve Widths

Riparian Reserves are specified on page C-30 of these standards and guidelines for the following five categories of streams or waterbodies:

- ! Fish-bearing streams

- ! Permanently flowing nonfish-bearing streams
- ! Constructed ponds and reservoirs, and wetlands greater than 1 acre
- ! Lakes and natural ponds
- ! Seasonally flowing or intermittent streams, wetlands less than 1 acre, and unstable and potentially unstable areas

Standards and guidelines specific to Riparian Reserves begin on page C-31.

Intermittent Streams

Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria.

Including intermittent streams and wetlands within Riparian Reserves is important for successful implementation of the Aquatic Conservation Strategy. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. The following discussion provides guidance on steps to identify these features for inclusion within Riparian Reserves.

Fish-bearing streams are distinguished from intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the standards and guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

The following discussion pertains to Riparian Reserve widths on intermittent streams and wetlands necessary to meet Aquatic Conservation Strategy objectives. Other Riparian Reserve objectives, such as providing wildlife dispersal corridors, could lead to Riparian Reserve widths different than those necessary to protect the ecological integrity of the intermittent stream or wetland. These other objectives could yield wider Riparian Reserves than those necessary to meet Aquatic Conservation Strategy objectives. There can never be instances where Riparian Reserves would be narrower than the widths necessary to meet Aquatic Conservation Strategy objectives.

The width of Riparian Reserves necessary to protect the ecological integrity of intermittent streams varies with slope and rock type. Figure B-1 shows the estimated size of Riparian Reserves necessary to protect the ecological values of intermittent streams with different slope and rock types. These estimates were made by geomorphologists, hydrologists, and fish biologists from the Bureau of Land Management, Forest Service, and the Environmental Protection Agency. These distances are consistent with the height of one site-potential tree used to define Riparian Reserve widths (see page C-30 of these standards and guidelines).

Watershed analysis provides the ecological and geomorphic basis for changing the size and location of Riparian Reserves.

The prescribed widths for Riparian Reserves apply to all streams, lakes, ponds and wetlands on lands administered by the Forest Service and BLM within the range of the northern spotted owl until a watershed analysis is completed. Watershed analysis is expected to yield the contextual information needed to define ecologically and geomorphically appropriate Riparian Reserves. Analysis of site-specific characteristics may warrant Riparian Reserves that are narrower or wider than the prescribed widths. Thus, it is possible to meet the objectives of at least the Aquatic Conservation Strategy portion of these standards and guidelines with post-watershed analysis reserve boundaries for intermittent streams that are quite different from those conforming to the prescribed widths. Regardless of stream type, changes to Riparian Reserves must be based on scientifically sound reasoning, and be fully justified and documented.

Wetlands

The combinations of hydrology, soils, and vegetative characteristics are the primary factors influencing the development of wetland habitats. There must be the presence of surface water or saturated soils to significantly reduce the oxygen content in the soils to zero or near zero concentrations. These low or zero soil oxygen conditions must persist for sufficient duration to promote development of plant communities that have a dominance of species adapted to survive and grow under zero oxygen conditions. These wetland characteristics apply when defining wetlands for regulatory jurisdiction or for technical analysis when conducting inventories or functional assessments. Seeps and springs can be classified as streams if they have sufficient flow in a channel or as seasonal or perennial wetlands under the criteria defined in the 1987 Corps of Engineers Wetlands Manual. The standards and guidelines for wetlands, which are based on the hydrologic, physical and biologic characteristics described in the manual, apply to seeps and springs regardless of their size.

Formal definition for implementing section 404 of the Clean Water Act, adopted by the Environmental Protection Agency, is as follows:

The term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

Detailed technical methods have been developed to assist in identification of wetlands that meet the above definition. Currently, the field manual being used for implementing the Clean Water Act is the “1987 Corps Manual.”

For purposes of conducting the National Wetland Inventory, the Fish and Wildlife Service has broadly defined both vegetated and nonvegetated wetlands as follows:

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained

hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Wetlands typically occur within and adjacent to riparian zones. It is frequently difficult to differentiate wetlands from riparian areas based on the definitions. Most typically, and particularly in forested landscapes, the riparian zone is defined by its spatial relation to adjacent streams or rivers. However, riparian zones are also commonly considered to be lands integrally related to other aquatic habitats such as lakes, reservoirs, intermittent streams, springs, seeps, and wetlands.

Because of such conceptual and definitional vagaries, there is spatial overlap between wetlands and riparian zones. This then results in only a portion of the riparian zone associated with rivers and streams being considered as wetlands. The extent of that portion will depend on the specifics of hydrologic, vegetation, and soil features. The functions of the wetland portion may also be distinct from the nonwetlands. For example, wetlands may provide habitat for specialized plant species or reproductive habitat for amphibians or other organisms that would not be provided by riparian areas.

Once the Riparian Reserve width is established, either based on existing widths or watershed analysis, then land management activities allowed in the Riparian Reserve will be directed by standards and guidelines for managing Riparian Reserves (see page C-31). The standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives.

Summary of Aquatic Conservation Strategy for Riparian Reserves:

- ! Involves portions of the landscape where riparian-dependent and stream resources receive primary emphasis.
- ! Riparian Reserves are designated for all permanently-flowing streams, lakes, wetlands, and intermittent streams.
- ! Riparian Reserves include the body of water, inner gorges, all riparian vegetation, 100-year floodplain, landslides and landslide prone areas.
- ! Reserve widths are based on some multiple of a site-potential tree or a prescribed slope distance, whichever is greater. Reserve widths may be adjusted based on watershed analysis to meet Aquatic Conservation Strategy objectives.
- ! Standards and guidelines prohibit programmed timber harvest, and manage roads, grazing, mining and recreation to achieve objectives of the Aquatic Conservation Strategy (see page C-31).

2. Key Watersheds

There are 8,119,400 acres of Tier 1 Key Watersheds, and 1,001,700 acres of Tier 2 Key Watersheds within the range of the northern spotted owl. Key Watersheds overlay the land allocations of designated areas and matrix as follows:

Acres in each designated area and matrix, by Key and non-Key Watersheds.

	<u>Tier 1</u>	<u>Tier 2</u>	<u>non-Key</u>	<u>Total</u>
<u>Designated Areas</u>				
Congressionally Reserved Areas	2,728,000	311,200	4,281,400	7,320,600
Late-Successional Reserves	3,151,700	279,100	4,000,000	7,430,800
Adaptive Management Areas	228,100	60,600	1,233,100	1,521,800
Managed Late-Successional Areas	55,100	0	47,100	102,200
Administratively Withdrawn Areas	407,900	54,700	1,014,500	1,477,100
Riparian Reserves (based on sample)	631,000	113,700	1,882,800	2,627,500
<u>Matrix</u>				
Matrix	<u>917,600</u>	<u>182,400</u>	<u>2,875,300</u>	<u>3,975,300</u>
Total	8,119,400	1,001,700	15,334,200	24,455,300

Refugia are a cornerstone of most species conservation strategies. They are designated areas that either provide, or are expected to provide, high quality habitat. A system of Key Watersheds that serve as refugia is crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat as well as areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have a high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program (see Watershed Restoration later in this section of these standards and guidelines).

The Aquatic Conservation Strategy includes two designations for Key Watersheds. Tier 1 (Aquatic Conservation Emphasis) Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. Tier 1 Key Watersheds consist primarily of watersheds identified previously by the Scientific Panel on Late-Successional Forest Ecosystems (1991), and in the Scientific Analysis Team Report (1993). The network of 143 Tier 1 Key Watersheds ensures that refugia are widely distributed across the landscape. While 21 Tier 2 (other) Key Watersheds may not contain at-risk fish stocks, they are important sources of high quality water.

Long-term management within Key Watersheds requires watershed analysis prior to further resource management activity. In the short term, until watershed analysis can be completed, minor activities such as those that would be Categorical Excluded under National Environmental Policy Act regulations (except timber harvest) may proceed if they are consistent with Aquatic Conservation Strategy objectives and apply Riparian Reserves and

standards and guidelines. Timber harvest, including salvage, can not occur in Key Watersheds without a watershed analysis. Key Watersheds that currently contain poor quality habitat are believed to have the best opportunity for successful restoration and will receive priority in any watershed restoration program.

Roadless Areas and Key Watersheds

Management activities in inventoried roadless areas with unstable land will increase the risk to aquatic and riparian habitat, impair the capacity of Key Watersheds to function as intended, and limit the potential to achieve Aquatic Conservation Strategy objectives. Standards and guidelines that refer to inventoried roadless areas (or simply “roadless areas”) apply only to those portions of such areas that would still qualify as roadless under the guidelines used to originally designate the areas under the second Forest Service Roadless Area Review and Evaluation (RARE II).

To protect the remaining high quality habitats, no new roads will be constructed in inventoried roadless areas in Key Watersheds. Watershed analysis must be conducted in all non-Key Watersheds that contain roadless areas before any management activities can occur within those roadless areas.

The amount of existing system and nonsystem roads within Key Watersheds should be reduced through decommissioning of roads. Road closures with gates or barriers do not qualify as decommissioning or a reduction in road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds. That is, for each mile of new road constructed, at least one mile of road should be decommissioned, and priority given to roads that pose the greatest risks to riparian and aquatic ecosystems.

Summary of Aquatic Conservation Strategy for Key Watersheds:

- ! Tier 1 Key Watersheds were selected for directly contributing to anadromous salmonid and bull trout conservation.
- ! Tier 2 Key Watersheds were selected as sources of high quality water and may not contain at-risk fish stocks
- ! No new roads will be built in roadless areas in Key Watersheds.
- ! Reduce existing system and nonsystem road mileage outside roadless areas. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds.
- ! Key Watersheds are highest priority for watershed restoration.
- ! Watershed analysis is required prior to management activities, except minor activities such as those Categorical Excluded under NEPA (and not including timber harvest).
- ! Timber harvest cannot occur in Key Watersheds prior to completing a watershed analysis.

Standards and guidelines specific to Key Watersheds are summarized on page C-7 of these standards and guidelines.

3. Watershed Analysis

Watershed analysis, as described here, focuses on implementing the Aquatic Conservation Strategy. The broader role of watershed analysis in relation to implementing the ecosystem management objectives proposed by these standards and guidelines is described in Section E, Implementation. Watershed analysis is one of the principal analyses that will be used in making decisions on implementation of the Aquatic Conservation Strategy.

Watershed analysis is required in Key Watersheds, for roadless areas in non-Key Watersheds, and Riparian Reserves prior to determining how proposed land management activities meet Aquatic Conservation Strategy objectives. Watershed analyses must be completed before initiating actions within a Key Watershed, except that in the short term, until watershed analysis can be completed, minor activities such as those that would be categorically excluded under National Environmental Policy Act regulations (except timber harvest) may proceed if they are consistent with Aquatic Conservation Strategy objectives and Riparian Reserves and standards and guidelines are applied. Timber harvest, including salvage, cannot occur in Key Watersheds without a watershed analysis. Ultimately, watershed analyses should be conducted in all watersheds on federal lands as a basis for ecosystem planning and management.

Watershed analysis has a critical role in providing for aquatic and riparian habitat protection. In planning for ecosystem management and establishing Riparian Reserves to protect and restore riparian and aquatic habitat, the overall watershed condition and the array of processes operating there need to be considered. Watershed condition includes more than just the state of the channel and riparian area. It also includes the condition of the uplands, distribution and type of seral classes of vegetation, land use history, effects of previous natural and land-use related disturbances, and distribution and abundance of species and populations throughout the watershed. These factors strongly influence the structure and functioning of aquatic and riparian habitat. Effective protection strategies for riparian and aquatic habitat on federal lands must accommodate the wide variability in landscape conditions present across the Pacific Northwest. Watershed analysis plays a key role in the Aquatic Conservation Strategy, ensuring that aquatic system protection is fitted to specific landscapes.

Watershed analysis will focus on collecting and compiling information within the watershed that is essential for making sound management decisions. It will be an analytical process, not a decision-making process with a proposed action requiring NEPA documentation. It will serve as the basis for developing project-specific proposals, and monitoring and restoration needs for a watershed. Some analysis of issues or resources may be included in broader scale analyses because of their scope. The information from the watershed analyses will contribute to decision making at all levels. Project-specific NEPA planning will use information developed from watershed analysis. For example, if watershed analysis shows that restoring certain resources within a watershed could contribute to achieving landscape or ecosystem management objectives, then subsequent decisions will need to address that information.

The results of watershed analyses may include a description of the resource needs, capabilities, opportunities, the range of natural variability, spatially explicit information that will facilitate environmental

and cumulative effects analyses for NEPA, and the processes and functions operating within the watershed. Watershed analysis will identify potentially disjunct approaches and conflicting objectives within watersheds. The information from watershed analysis will be used to develop priorities for funding, and implementing actions and projects, and will be used in developing monitoring strategies and objectives. The participation of adjacent landowners, private citizens, interest groups, industry, various government agencies, and others in watershed analyses will be promoted.

Watershed analysis is a systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. This information will support decisions for implementing management prescriptions, including setting and refining boundaries of Riparian Reserves and other reserves, developing restoration strategies and priorities, and revealing the most useful indicators for monitoring environmental changes. Watershed analysis is an important analytical step supporting ecosystem planning for watersheds of approximately 20 to 200 square miles (Figure B-2). It is a key component supporting watershed planning and analyzing the blending of social expectations with the biophysical capabilities of specific landscapes. Watershed analysis is the appropriate level for analyzing the effects of transportation systems on aquatic and riparian habitats within the target watershed. In contrast, issues pertaining to stocks at risk would generally be more applicable at the province or river basin analytical levels, as discussed in Section E of these standards and guidelines, rather than the 20 to 200 square mile watershed level.

Watershed analysis consists of technically rigorous and defensible procedures designed to identify processes that are active within a watershed, how those processes are distributed in time and space, the current upland and riparian conditions of the watershed, and how all of these factors influence riparian habitat and other beneficial uses. The analysis is conducted by an interdisciplinary team consisting of geomorphologists, hydrologists, soil scientists, biologists and other specialists as needed. Information used in this analysis includes: maps of topography, stream networks, soils, vegetation, and geology; sequential aerial photographs; field inventories and surveys including landslide, channel, aquatic habitat, and riparian condition inventories; census data on species presence and abundance; water quality data; disturbance and land use history; and other historical data (e.g., streamflow records, old channel surveys).

Watershed analysis is organized as a set of modules that examine biotic and abiotic processes influencing aquatic habitat and species abundance (e.g., landslides, surface erosion, peak and low streamflows, stream temperatures, road network effects, coarse woody debris dynamics, channel processes, fire, limiting factor analysis for key species). Results from these modules are integrated into a description of current upland, riparian, and channel conditions; maps of location, frequency, and magnitude of key processes; and descriptions of location and abundance of key species.

Watershed analysis provides the contextual basis at the site level for decision makers to set appropriate boundaries of Riparian Reserves, plan land use activities compatible with disturbance patterns, design road transportation networks that pose minimal risk, identify what and where restoration activities will be most effective, and establish specific parameters and activities to be monitored. More detailed site-level analysis is conducted to provide the information and designs needed for specific projects (e.g., road siting or timber sale layout) so that riparian and aquatic habitats are protected.

Watershed analysis provides the ecologic and geomorphic basis for changing the size and location of Riparian Reserves necessary to meet Aquatic Conservation Strategy objectives. Ultimate design of Riparian Reserves is likely to be a hybrid of decisions based on consideration of sites of special ecological

value, slope stability, wildlife dispersal corridors, endemic species considerations and natural disturbance processes.

Figure B-3 illustrates how slope stability and debris flow runout models may be used as part of watershed analysis for adjusting Riparian Reserves. The result is that the basin is stratified into areas that may require wider or narrower Riparian Reserves than those conforming to Riparian Reserve Scenario 1 for intermittent streams. For example, on intermittent streams in unstable areas with high potential to generate slides and debris flows, Riparian Reserves wider than those conforming to the definition may be necessary to ensure ecological integrity. Riparian Reserves in more stable areas may be less extensive, managed under upland standards and guidelines (e.g., levels of green-tree retention as either single trees or in patches of a specific size), or a combination of these.

Slope stability analysis for Augusta Creek is an example in which likely impact mechanisms are identified (Figure B-4). Distribution of areas subject to slope instability was interpreted from information contained within the Willamette National Forest Soil Resource Inventory. Slope data for each mapped unit was extracted from the Willamette National Forest Soil Resource Inventory based on whether hillslope gradients were less than 30 percent, between 30 and 60 percent, and greater than 60 percent. Geologic descriptions from the Willamette National Forest Soil Resource Inventory were used to determine whether underlying bedrock was hard, moderately hard, or soft. A hazard rating of low, moderate, or high slide potential was assigned to each mapped unit based on hillslope gradient and geologic description (Figure B-4). Predicted hazard ratings were tested and found to be in excellent agreement with the historical pattern of landslides observed on aerial photographs. This analytical step ensures that field and analysis time will be used efficiently to address the most important processes and issues in the watershed.

Using the results from the slope stability analysis, watersheds were stratified into subareas in order to evaluate the watersheds as uniform response units for each of the processes or issues of concern. The process of determining debris flow susceptibility for Augusta Creek is an example of how a watershed might be stratified and how this stratification may be used as a basis for mapping Riparian Reserves (Figure B-3). To determine the susceptibility of different stream reaches to debris flows, a stream network map was overlaid on the slide potential map (Figure B-4). Areas with high slope instability were assumed to be most likely to generate debris flows. First-order channels (headward channels without tributaries) were assigned a debris flow hazard rating equal to the slide potential of the surrounding landscape (Figure B-4). Debris flow hazard to higher order channels downstream was assumed to be a function of two factors: channel gradient (Figure B-5) and tributary junction angle (Figure B-6). Debris flow hazard was reduced on the class where channel gradient was less than 3 degrees or tributary junction angle exceeded 70 degrees, to produce a map of debris flow potential (Figure B-7). The stratification will vary according to process or issue.

Within a given physiographic province, similar geographic and topographic features control drainage network and hillslope stability patterns. These features may exert a strong influence on the design of Riparian Reserves. For example, in the highly dissected southern Oregon Coast Range, debris flows originating in channel heads are the primary mass movement process. Large, slow-moving earthflows are dominant in the western Oregon Cascades. Earthflows qualify as unstable and potentially unstable areas and would be analyzed for inclusion within Riparian Reserves for intermittent streams. To adequately protect the aquatic system from management induced landsliding, Riparian Reserve design may vary as a result of these differences. In the Coast Range, Riparian Reserves would tend to be in narrow bands associated with intermittent streams, relatively evenly distributed throughout the basin, while those in the

Cascades may be locally extensive and centered around earthflows. Stable areas in other parts of the watershed may have reduced Riparian Reserves on intermittent streams.

Earthflows can cover extensive amounts of land within a watershed. As such, they largely influence the resulting landscape and directly affect aquatic and riparian habitat quality, structure and function. For example, streams flowing through active earthflows would tend to cut the toes of the inner gorges. Thus, the earthflow would serve as a chronic source of sediment to the channel. The effects of constructing roads or harvesting timber on the rate of sediment delivery to the channel on the earthflow would need to be considered during the design of the Riparian Reserve. Thus, the amount of a particular earthflow incorporated into a Riparian Reserve, as identified through watershed analysis, depends on the risk of management-induced disturbances and meeting Aquatic Conservation Strategy objectives. The risk will be determined based on an analysis of the projected instability of the earthflow relative to the recovery rate of aquatic and riparian ecosystems. There will be cases where entire earthflows will be incorporated into Riparian Reserves and cases where only those portions determined to directly affect the rate of achieving Aquatic Conservation Strategy objectives will be incorporated.

The efficacy of many previous analyses at the watershed level suffered from unclear logic used in weighting or combining individual elements, reliance on simple indices to explain complex phenomena, and assumptions of direct or linear relations between land use intensity and watershed response. These previous watershed analyses typically did not consider how key processes are distributed over watersheds within a given landscape and, in many cases, did not distinguish between physiographic provinces, which can vary widely in the importance of individual processes. Furthermore, most of the previous approaches lacked any method to validate their assumptions or results.

While watershed analysis can provide essential information for designing land use activities over the entire watershed, it can also highlight uncertainties in knowledge or understanding that need to be addressed. Watershed analysis is emerging as a new standard for assessing watershed condition and land use impacts. The process described in these standards and guidelines builds on more recent, comprehensive approaches, including the Water Resources Evaluation of Nonpoint Silvicultural Sources program; the watershed analysis procedure developed by the Washington State Timber, Fish and Wildlife program; and the cumulative effects methods being developed by the National Council on Air and Stream Improvement. Analysis modules in Watershed Analysis are patterned after the first two approaches because a modular approach allows flexibility in selecting methods appropriate to a particular watershed and facilitates modification of specific techniques as improved methods become available. Unique aspects of the watershed analysis procedure described in the FEMAT Report include explicit consideration of biological as well as physical processes, and the joint consideration of upland and riparian areas.

Watershed analysis is one of the important aspects of effectively implementing ecosystem planning and management on a watershed basis. Information gained through watershed analysis will be vital to adaptive management over broad physiographic provinces. When current plans and draft plan preferred alternatives are revised, information gathered through watershed analysis will, in part, be the basis of these revisions.

Summary of Aquatic Conservation Strategy for Watershed Analysis:

- !** Watershed analysis is a systematic procedure to characterize watersheds. The information is used to guide management prescription and monitoring programs, set and refine Riparian Reserve boundaries, and develop restoration.

- ! It is required in Key Watersheds prior to resource management.
- ! It is required in all roadless areas prior to resource management.
- ! It is recommended in all other watersheds.
- ! It is required to change Riparian Reserve widths in all watersheds.
- ! Earthflows qualify as unstable and potentially unstable areas and would be analyzed for inclusion within Riparian Reserves.
- ! Watershed analysis is important in developing monitoring strategies.

4. Watershed Restoration

Watershed restoration will be an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. Restoration will be based on watershed analysis and planning. Watershed analysis is essential to identify areas of greatest benefit-to-cost relationships for restoration opportunities and greatest likelihood of success. Watershed analysis can also be used as a medium to develop cooperative projects involving various landowners. In many watersheds the most critical restoration needs occur on private lands downstream from federally managed lands. Decisions to apply a given treatment depend on the value and sensitivity of downstream uses, transportation needs, social expectations, risk assessment of probable outcomes for success at correcting problems, costs, and other factors. Watershed analysis, including the use of sediment budgets, provides a framework for considering benefit-to-cost relations in a watershed context. Thus, the magnitude of restoration needs within the planning area will be based on watershed analysis.

The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity. Other restoration opportunities exist, such as meadow and wetland restoration and mine reclamation, and these may be quite important in some areas. Regionally however, these opportunities are much less extensive than the three components listed above.

Roads

Road treatments range from full decommissioning (closing and stabilizing a road to eliminate potential for storm damage and the need for maintenance) to simple road upgrading, which leaves the road open. Upgrading can involve practices such as removing soil from locations where there is a high potential of triggering landslides, modifying road drainage systems to reduce the extent to which the road functions as an extension of the stream network, and reconstructing stream crossings to reduce the risk and consequences of road failure or washing out at the crossings.

The decision to apply a given treatment depends on the value and sensitivity of downstream uses, transportation needs, social expectations, assessment of probable outcomes for success at correcting problems, costs, and other factors. Watershed analysis, including the use of sediment budgets, provides a framework for considering benefit-to-cost relations in a watershed context. Thus, the magnitude of regional restoration needs will be based on watershed analysis.

Riparian Vegetation

Active silvicultural programs will be necessary to restore large conifers in Riparian Reserves. Appropriate practices may include planting unstable areas such as landslides along streams and flood terraces, thinning densely-stocked young stands to encourage development of large conifers, releasing young conifers from overtopping hardwoods, and reforesting shrub and hardwood-dominated stands with conifers. These practices can be implemented along with silvicultural treatments in uplands areas, although the practices will differ in objective and, consequently, design.

In-Stream Habitat Structures

In-stream restoration, based on the interpretation of physical and biological processes and deficiencies during watershed analysis, can be an important component of an overall program for restoring fish and riparian habitat. In-stream restoration measures are inherently short term and must be accompanied by riparian and upslope restoration to achieve long-term watershed restoration. Maintaining desired levels of channel habitat complexity, for example, may best be achieved in the short term by introducing structures. However, a riparian area with the complete array of functions and processes should provide coarse woody debris to the channel in the long term.

In-stream restoration will be accompanied by riparian and upslope restoration if watershed restoration is to be successful. In-stream restoration, including in-channel structures, will not be used to mitigate for management actions that degrade existing habitat, as a substitute for habitat protection, or to justify risky land management activities and practices. Priority must be given to protecting existing high quality habitat.

Summary of Aquatic Conservation Strategy for Watershed Restoration:

- ! Watershed restoration restores watershed processes to recover degraded habitat.
- ! Watershed restoration should focus on removing and upgrading roads.
- ! Silvicultural treatments may be used to restore large conifers in Riparian Reserves.
- ! Watershed restoration should restore channel complexity. In-stream structures should only be used in the short term and not as a mitigation for poor land management practices.

Monitoring

The following monitoring section is specific to achieving the stated objectives of the Aquatic Conservation Strategy. Implementation, effectiveness, and validation monitoring need to be conducted consistent with the monitoring discussion in Section E of these standards and guidelines.

Watershed analysis will support decisions for a variety of planned ecosystem management actions within watersheds. Specific actions may include habitat restoration, sediment reduction programs, road removal and management, timber harvesting, development of a recreation facility, or any of a multitude of activities. Monitoring will be an essential component of these management actions and will be guided by the results of watershed analysis.

General objectives of monitoring will be to: (1) determine if Best Management Practices have been implemented, (2) determine the effectiveness of management practices at multiple scales, ranging from individual sites to watersheds, and (3) validate whether ecosystem functions and processes have been maintained as predicted. In addition, monitoring will provide feedback to fuel the adaptive management process.

Specific monitoring objectives will be derived from results of the watershed analysis and tailored to each watershed. Monitoring at the 20 to 200 square mile watershed level will link monitoring for ecosystem management objectives for multiple scales of province, river basin, smaller watershed and site-specific levels. Specific locations of unstable and potentially unstable areas, roads, and harvest activities will be identified. In addition, the spatial relationship of potentially unstable areas and management actions to sensitive habitats such as wetlands will be determined. This information provides a basis for targeting watershed monitoring activities to assess outcomes associated with risks and uncertainties identified during watershed analyses.

Under natural conditions, river and stream habitats on federal forest lands exhibit an extremely wide diversity of conditions depending on past disturbances, topography, geomorphology, climate and other factors. Consequently, riparian area monitoring must be dispersed among the various landscapes rather than concentrated at a few sites and then extrapolated to the entire forest. Logistical and financial constraints require a stratified monitoring program that includes:

- ! Post-project site review
- ! Reference to subdrainages
- ! Basin monitoring
- ! A water quality network
- ! Landscape integration of monitoring data

A stratified monitoring program examines watersheds at several spatial and temporal scales. Information is provided on hillslope, floodplain, and channel functions, water quality, fish and wildlife habitat and populations, and vegetation diversity and dynamics.

Parameters selected for monitoring depend on the activities planned for a given watershed designed to specifically address forest practices and associated activities such as road construction and maintenance. Two of the more extensive activities related to water quality are timber harvest and road related operations. Other activities such as mining and in-stream channel alterations to improve habitat can affect water quality in localized areas. In addition to chemical and physical parameters, biological criteria may be appropriate to monitor using techniques such as Rapid Bioassessment Protocols for macroinvertebrates or the index of biotic integrity for fish diversity.

Long-term systematic monitoring in selected watersheds will be necessary to provide reference points for effectiveness and validation monitoring. These watersheds should represent a range of forest and stream conditions that have been exposed to natural and induced disturbance. Reference watersheds, subbasins, and individual sites will be selected as part of the overall adaptive management process described as part of these standards and guidelines.

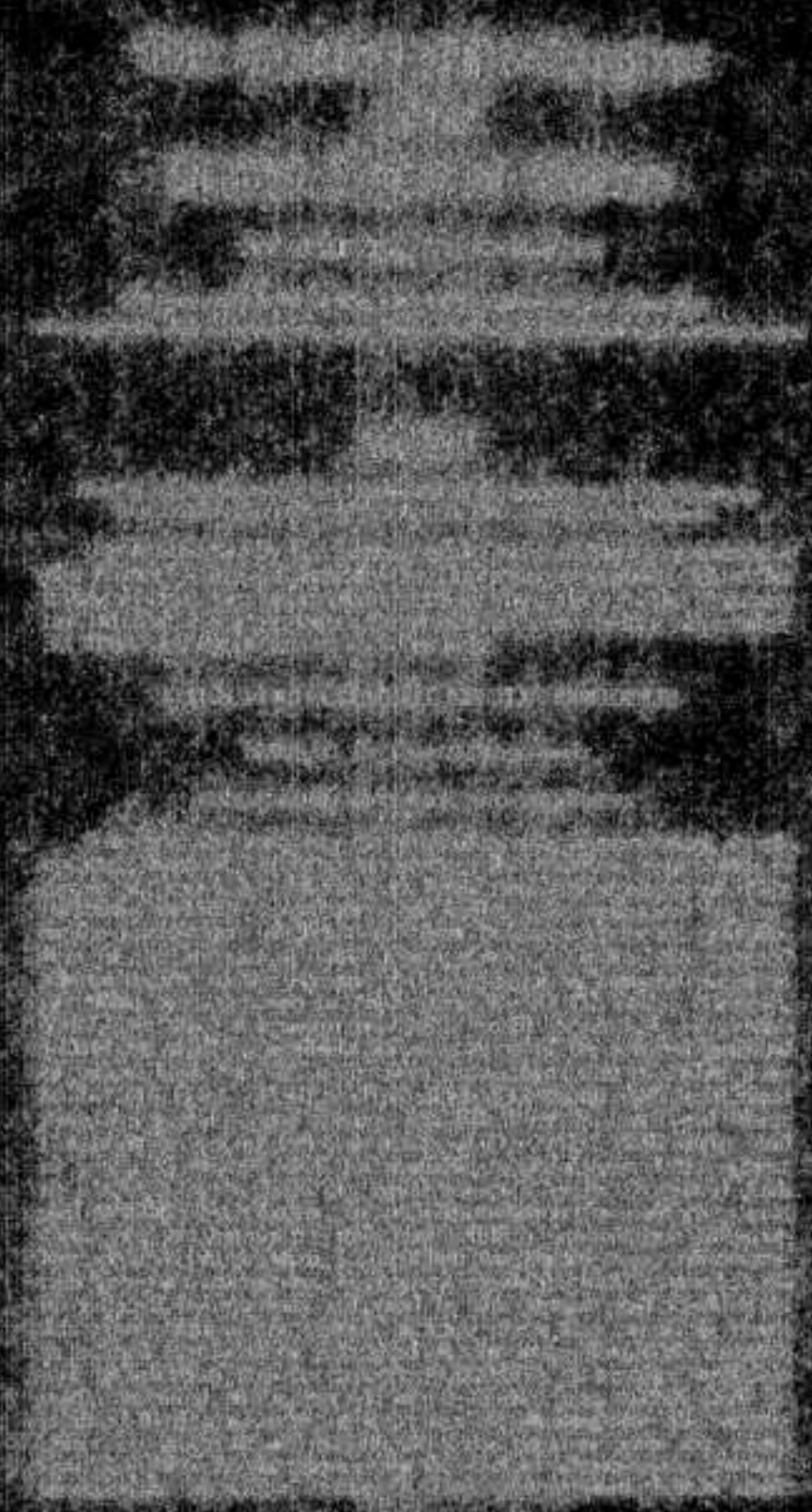
Study plans will be cooperatively developed based on province, river basin, and/or watershed level analyses. Long-term data sets from reference watersheds will provide an essential basis for adaptive management and a gauge by which to assess trends in in-stream condition.

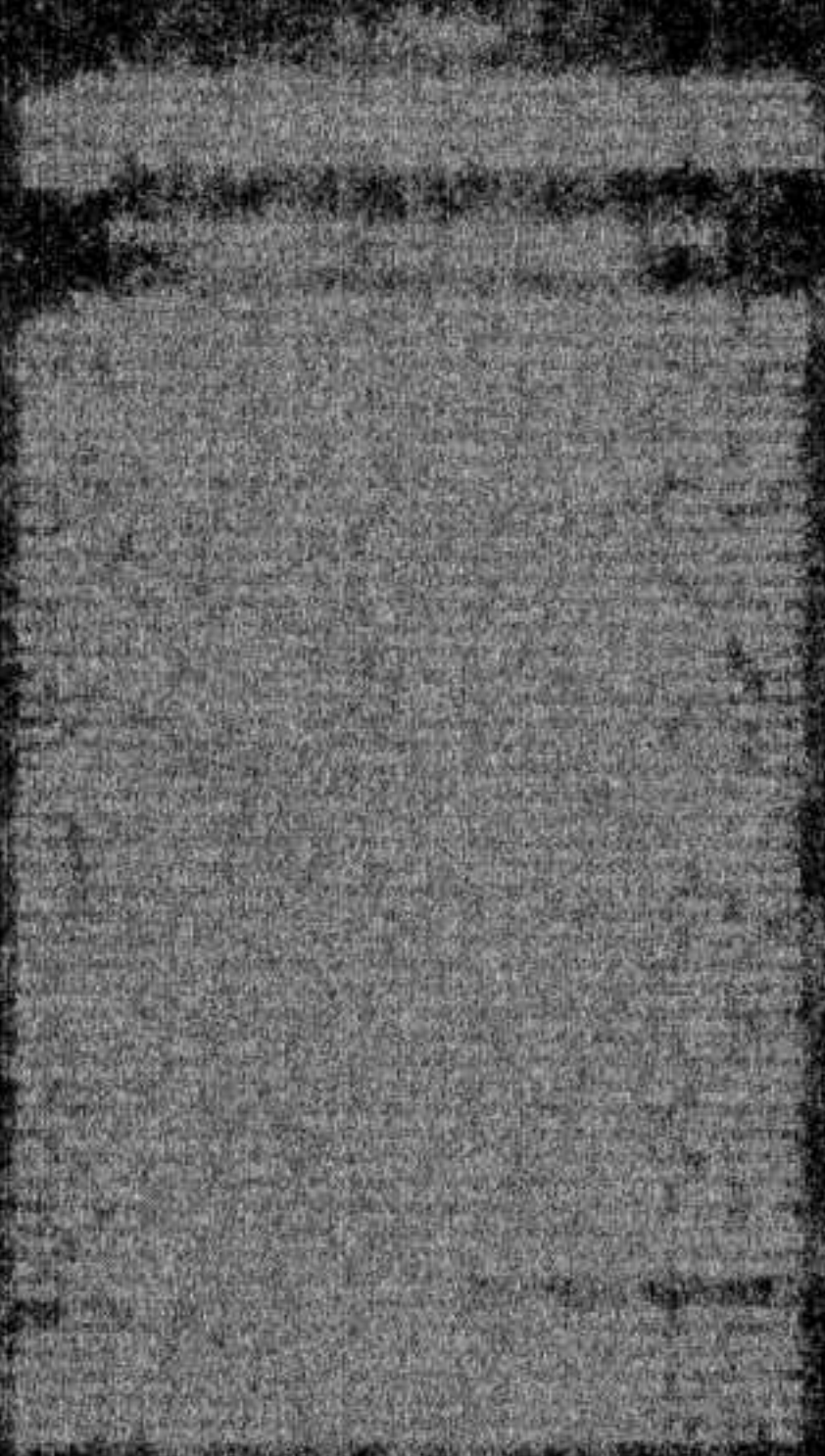
Monitoring plans must be tailored for each watershed. Significant differences in type and intensity of monitoring will occur based on watershed characteristics and management actions. For example, carefully targeted restoration activities may only require effectiveness monitoring of single activities, whereas watershed-scale restoration would be accompanied by extensive riparian and in-stream monitoring. The specific design of monitoring programs can best be accomplished by the local interdisciplinary teams working in cooperation with state programs. Pooling the monitoring resources of federal and state agencies is a necessity to provide interagency consistency and to increase available resources.

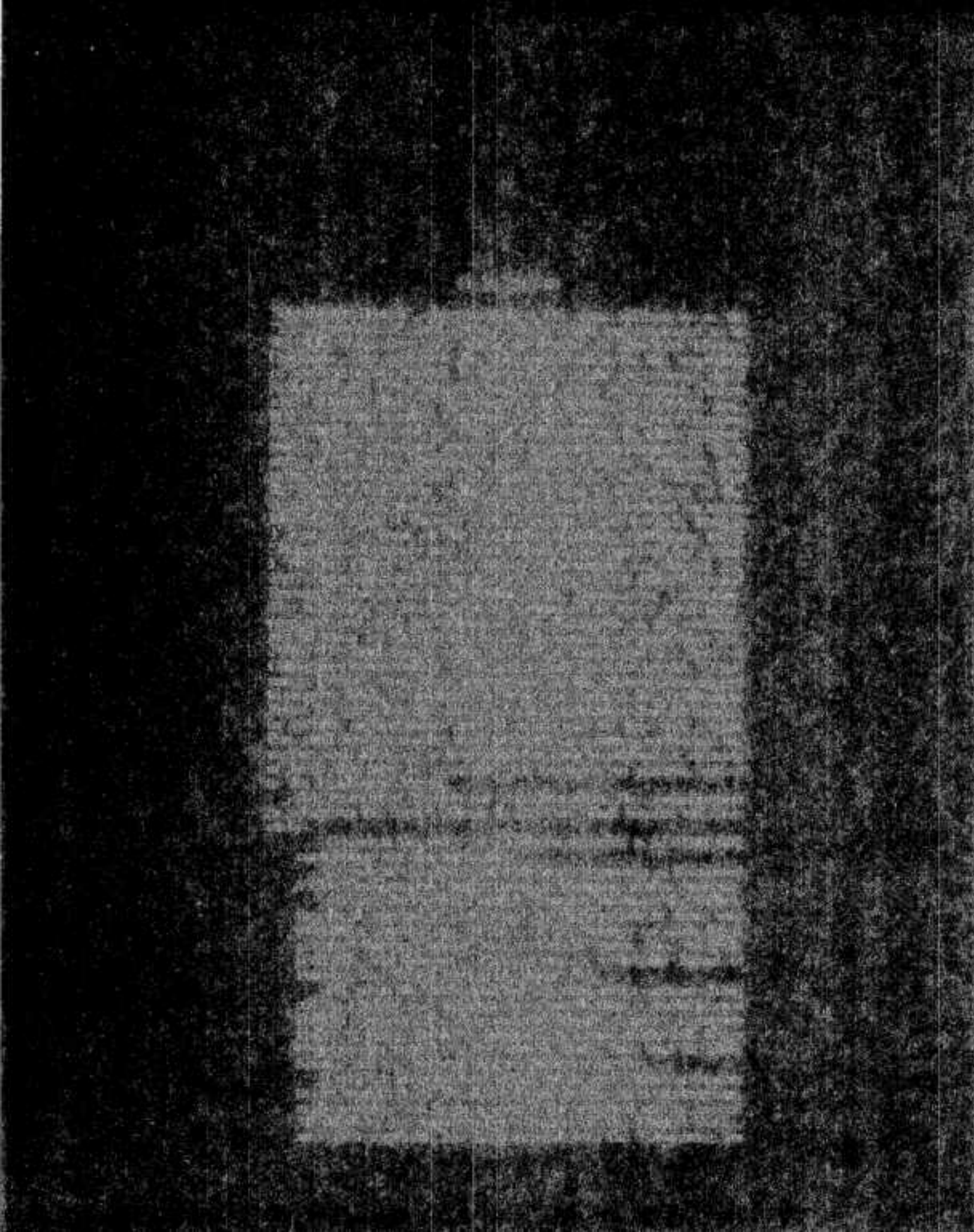
Monitoring will be conducted and results will be documented, analyzed and reported by the agency or agencies responsible for land management in any particular watershed. Reports will be reviewed by local interdisciplinary teams. In addition, water resource regulatory agencies may review results to determine compliance with appropriate standards, and province and river basin-level strategies. A cross-section of team members that includes participants from states and regulatory agencies should assess monitoring results and recommend changes in Best Management Practices or the mechanisms for Best Management Practice implementation.

Appendix C. Reserve Legislation

11. 3. 2007







1. X. 1911

The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1911. The names are listed in alphabetical order of their surnames. The names of the persons who have been elected to the office of Justice of the Peace for the year 1911 are as follows:

1. J. A. Smith
2. J. B. Jones
3. J. C. Brown
4. J. D. White
5. J. E. Black
6. J. F. Green
7. J. G. Gray
8. J. H. Hall
9. J. I. Hill
10. J. K. King
11. J. L. Lamb
12. J. M. Martin
13. J. N. Nash
14. J. O. Olson
15. J. P. Parker
16. J. Q. Quinn
17. J. R. Reed
18. J. S. Shaw
19. J. T. Taylor
20. J. U. Underhill
21. J. V. Vance
22. J. W. Walker
23. J. X. Ward
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The following information was obtained from the records of the [redacted] Department of the Army, Office of the Adjutant General, at Fort Belvoir, St. Louis, Missouri.

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Appendix D. Federal Recreational Fee Demonstration Program

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Legislative Background

In 1993, Congress enacted deficit reduction legislation by passage of Public Law 103-66, the Omnibus Budget Reconciliation Act of 1993, which amended the 1965 Land and Water Conservation Fund Act. This fee legislation directed a number of changes in the U.S. Department of Interior Bureau of Land Management (BLM) recreation fee program. In the 1996 Interior appropriations bill, Congress gave BLM the authority to establish a demonstration program to test the collection, retention, and reinvestment of new admission and user fees. The legislation authorizes BLM, the National Park Service, U.S. Fish and Wildlife Service, and U.S. Forest Service to each implement 100 test projects (U.S. Department of the Interior et al. 2000). This new Recreational Fee Demonstration Program allows BLM to use all of the fee income for the costs of operating the sites where the fees are collected.

Fee Uses

Recreation use fees may be charged wherever the agencies are providing specialized recreational management, such as for use of campgrounds, use of boat launch facilities, backcountry camping under permits, river rafting where regulated. The fees range from \$3 to \$5 for daily use/parking permits, are typically \$40 for seasonal passes, and include a \$15 fee to climb Mount Shasta and \$100 per person fees to run the Grand Canyon's Colorado River.

Participating agencies are authorized to retain all of the revenues from the Program and to retain at least 80% of the revenues at the sites where they are collected. Funds generated may only be spent on recreational management and visitor facilities. The fees collected by the BLM are used to improve campgrounds, parking areas, visitor services, site access, safety and health services, and environmental protection (U.S. Department of the Interior et al. 2000).

Innovation in Fee Programs

There are many attempts to implement and evaluate innovative fee arrangements at the regional and local levels. Examples of these efforts include (U.S. Department of the Interior et al. 2000)

- **Use of Volunteers.** Several national wildlife refuges use volunteers to collect their fees. This use of volunteers is an increasingly important resource at fee sites of all the agencies participating in the Program.
- **Fee Collection Partnerships.** Some agencies are forming partnerships with volunteers and concessionaires to collect fees for the Program.
- **Interpretive Services as an Adjunct to Fees.** The BLM Eagle Lake Field Office in California entered into a cooperative venture on a trial basis with a local bus company to provide, for a small fee, shuttle service to bring bikes and riders back to their vehicles. On board the shuttle was an interpreter who explained resource features and sites of special interest along the route. The fall colors attracted more visitors, who came specifically to use the shuttle. Strong user demand necessitated additional buses for some of the busier weekends.
- **Automated Fee Collection.** In the California Desert District, BLM has more than 17 automated fee stations, with all machines under contract for collection and maintenance. This arrangement has allowed the BLM to use its human resources for other, more challenging jobs. Compliance has been very high, well accepted, and has been very convenient for the public. The machines are provided under a lease arrangement that includes machine maintenance and the collection and processing of the revenues.
- **Vendor Sales.** The BLM Wenatchee Field Office uses a seasonal use permit sticker. Permits are sold through vendors at a number of locations in the vicinity of the recreational fee area.

Results of BLM's Recreational Fee Demonstration Program

Under the Program, BLM increased its recreation fee projects from 10 in 1997 to 95 in 1999 (U.S. Department of the Interior et al. 2000). All of these sites have high numbers of visitors and a single point of entry to the fee site. Visitation to the Program sites in 1999 was relatively unchanged from visitation in years prior to Program implementation. There appears to be no correlation between the year a fee was introduced and a change in visitation.

Both general day-use fees and special activity permits (for river-float boating, off-highway-vehicle [OHV] riding, mountain biking, back country use, boat ramps, fishing, rock climbing, and hiking, in particular sites) were successful in generating revenues in excess of collection costs. The most successful method of fee collection was through the mail when permits were required for recreation activities. Fee collection by BLM representatives on site was also successful in achieving user compliance. The honor system has been shown to be moderately successful at recreation sites of high visitation but has resulted in the least compliance. (In some cases, members of groups that have had an important role in the development and management of a particular recreation site may expect that their contributions entitle them to free entrance.) The presence of agency representatives for enforcement led to both higher compliance rates and higher administrative costs (U.S. Department of the Interior et al. 2000).

Public Acceptance

The participating resource management agencies report high public acceptance of the fee program. Responding to agency surveys, approximately 90% of visitor respondents said the level

of fees is “about right” or “too low.” However, some recreational user groups, such as the International Mountain Bicycling Association and the Backcountry Horsemen of Washington, oppose user fees. They argue that public lands should be funded by taxes, that charging fees discriminates against low-income families, and that recreational interests that generate the most income (OHV use, power boating) will take precedence over lower impact activities (Inland Empire Chapter of Backcountry Horsemen of Washington Inc. 1999, International Mountain Bicycling Association 2000).

BLM has incorporated several suggestions from the public into the program, including the provision of free days for select groups, such as economically disadvantaged persons, educational institutions, and volunteers. Some pilot sites have public representatives on advisory boards.

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Appendix E. Visual Resource Management Classes

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Visual Resources

An inventory of visual resources was conducted by the Arcata Field Office of the U.S. Department of Interior Bureau of Land Management (BLM). It evaluated and assessed the scenic quality of the landscape, the sensitivity of people to changes in the landscape, and the viewing distances to determine the degree of cultural modification allowed in any given area. These areas were then assigned management classes, ranging from level 1 (pristine) to level 5 (highly disturbed).

Scenic Quality

To evaluate scenic qualities of the Reserve, the area was divided into subunits based on relatively homogeneous landscapes. Each subunit was then evaluated by seven key factors (landform, vegetation, water, color, adjacent scenery, scarcity, cultural modifications) and rated from a standard point system. The greater the landscape's beauty, the higher the score.. Class A refers to areas that combine the most outstanding characteristics of each rating factor. Class B refers to areas in which there is a combination of some outstanding features and some features that are fairly common to the physiographic region. Class C refers to areas in which the features are fairly common to the physiographic region. The 3,100 acres of undisturbed old growth forest qualify as Class A. Approximately 2,750 acres qualify as Class C because they have recently been timber harvested. Class B lands comprise the remainder of the Reserve and total approximately 1,550 acres.

Sensitivity Levels

Visitor use and public attitudes or concern for particular areas within the Reserve determine levels (high, medium, low) of sensitivity. The undisturbed old-growth forest is rated high and the remaining lands are rated medium.

Distance Zones

The visual quality of the Reserve may be magnified or diminished by the visibility of the landscape from viewing routes and key observation points. Areas that are close to the visitor

usually have a greater effect than areas that are farther away. The landscape that can be seen from the trails was mapped and divided into four basic distance zones: foreground, middle ground, background, and seldom seen.

Management Classes

Visual resource management classes describe the different degrees of modification allowed to the basic elements of the landscape. Class designations were derived from analyzing the information obtained from the scenic quality, sensitivity levels, and distance zone evaluations.

- **Management Class 1:** Under this classification, natural ecological changes and very limited management activity are allowed. Any contrast created within the characteristic landscape must not attract attention. The undisturbed old-growth redwood forests totaling 3,100 acres fall under Class 1.
- **Management Class 2:** Under this classification, changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape. Contrasts are seen but must not attract attention. Approximately 1,550 acres are included in this management class and comprise the timber harvest areas that have had over 20 years of nondisturbance and generally appear in a natural condition to the common visitor.
- **Management Class 3:** Under this classification, contrasts to the basic elements caused by a management activity are evident but should remain subordinate to the existing landscape. This class includes approximately 2,750 acres of shrub and pole harvested areas, several other smaller timber harvest areas that require watershed restoration work, and the Elk River Corridor for the first three miles.
- **Management Class 4:** Under this classification, any contrast attracts attention and is a dominant feature on the landscape in terms of scale, but it should repeat the form, line, color, and texture of the characteristic landscape. The Elk River Trailhead, Salmon Pass Trailhead, and currently undeveloped Alicia Pass Trailhead fall into this category.

Appendix F. Visitor Management Zones

Appendix F. Visitor Management Zones

Visitor management and recreation activities in the Headwaters Forest Reserve (Reserve) must be consistent with the primary purpose for which the Reserve was created: the preservation and restoration of old-growth forest ecosystems and related values. Because the Reserve contains site-specific, highly sensitive areas (i.e., old-growth redwood forests and other less sensitive habitats that can accommodate a higher level of visitor use), it became apparent that certain geographical zones could be delineated to provide guidance on the extent of recreation opportunities allowed within the Reserve.

Three geographical zones were identified during the early stages of the planning process. Zone 1 (3,100 acres) covers the area containing the old-growth redwood forests. Zone 2 (4,000 acres) covers the timber harvest areas surrounding the old-growth forest. Zone 3 is the Elk River Corridor (300 acres), a high-impact area that can accommodate the highest level of visitor use. These three visitor management zones are described in more detail below and are consistent throughout all the management alternatives discussed in the EIS (figure 5-1).

- **Visitor Management Zone 1.** This zone would be managed to be essentially free of humans and human-made features (with the exception of minor edge intrusions). Strict controls would be implemented to prevent human activities. Overnight camping, mountain biking, motorized vehicle use, equestrian use, hunting, and fishing would be prohibited. A very limited amount of hiking may be allowed in 1 or more areas or seasonally, consistent with the protection and preservation of endangered species and old-growth values. Scientific studies and monitoring approved by the U.S. Department of Interior Bureau of Land Management and by the California Department of Fish and Game would be allowed on a case-by-case basis. Visitor use would not be expected to be more than 20 hikers per day, and contacts with other hikers not to exceed 10.
- **Visitor Management Zone 2.** This zone would be managed for predominantly natural or natural-appearing environments. Evidence of humans, restrictions, and controls are present but subtle. Motorized vehicle use, hunting, and fishing would be prohibited. Hiking would be allowed on designated trails only. Equestrian use and/or mountain biking may be allowed on designated trails only where support facilities and environmental considerations allow for such use. Limited facilities for the administration of visitor use would be allowed, but off-site administration is encouraged. On-site visitor management activities would stress protection of natural values, in harmony with the existing site conditions, and project designs will be rustic in nature. Backcountry use levels would be low, consistent with and dependent on maintaining and enhancing natural-appearing ecosystems.
- **Visitor Management Zone 3.** This zone would be managed to be a natural appearing environment. Evidence of humans, restrictions, and controls are present. Motorized vehicle use, hunting, and fishing would be prohibited. Hiking, mountain biking, and equestrian use

may be allowed on designated trails where support facilities and environmental considerations allow for such use. Facilities for the administration of visitor use would be allowed. On-site interpretive facilities, trails, signing, visitor use facilities, parking and staging areas would be designed with a rustic theme. Within this zone the concentration of users is moderate, and there is often evidence of others. Frequency of managerial contact would be high within developed facilities and moderate on trails.

Appendix G. Headwaters Wilderness Inventory and Study

Appendix G. Headwaters Wilderness Inventory and Study

Wilderness Inventory Evaluation

The U.S. Department of Interior Bureau of Land Management (BLM) conducted a wilderness inventory and study of the Headwaters Forest Reserve (Reserve) pursuant to policies established in the Final Wilderness Inventory and Study Procedures Handbook, dated January 9, 2001. This handbook contains BLM's policy, direction, general procedures, and guidance for the inventory and designation of wilderness study areas (WSAs) under provisions of Sections 201 and 202 of the Federal Land Policy and Management Act (FLPMA). These sections direct BLM to "prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including, but not limited to, outdoor recreation and scenic values), giving priority to areas of critical environmental concern."

The primary function of the wilderness inventory and study is to document the presence or absence of public lands with wilderness character. Identification of an area (as a Wilderness Inventory Area [WIA]) for inventory required combining existing land status and available road inventory data. Where a road, right-of-way, or nonpublic lands separated the public lands, they were then identified as separate WIAs.

It was important to evaluate whether the area being inventoried contains roads. To ensure a consistent identification of roads as opposed to a vehicle way, the following definition has been adopted by BLM: "The word 'roadless' refers to the absence of roads which have been improved and maintained by mechanical means to insure relatively regular and continuous use. A way maintained solely by the passage of vehicle does not constitute a road." *Improved and maintained* means that people intentionally take action to keep the road open to vehicle traffic. *Improved* does not necessarily mean formal construction. *Maintained* does not necessarily mean annual maintenance. *Mechanical means* is the use of hand or power machinery or tools. *Relatively regular and continuous use* means vehicular use which has occurred and will continue to occur on a relatively regular basis.

Four permanent roads were identified within the Reserve. These roads divided the Reserve into five WIAs. Evaluations of each WIA included

- a description of acreage, land ownership, location, topography, vegetation and summary of major human uses/activities;
- a wilderness character analysis, which includes size, naturalness, outstanding opportunity for solitude or primitive and unconfined recreation, and supplemental values; and

- a summary of the wilderness character analysis.

Color photographs were taken to document each WIA. They illustrate representative as well as unusual characteristics of the area. Such characteristics include roads, ways, topographic and vegetative features, recreational attractions, human impacts, development and facilities, and supplemental values which are important in evaluating the presence or absence of roads and wilderness values. Photos correlate to a large-scale map.

A permanent documentation file for each WIA, is available for public review at the Arcata Field Office. Each file describes acreage, land ownership, location, topography, vegetation, human impacts, the presence or absence of wilderness values and contains a summary of supplemental values.

Summary of WIA Inventory Evaluations

Wilderness Inventory Areas 01, 02, 03, and 04 are all very small. WIA 01 is 55 acres, WIA 02 is 75 acres, WIA 03 is 10 acres, and WIA 04 is approximately 275 acres. All 4 WIAs show very little sign of being in a natural condition and have been heavily influenced by human activities. WIAs 01, 02, and 03 were found not to have outstanding opportunities or either solitude or primitive and unconfined types of recreation. WIA 04 was identified as having outstanding opportunities for solitude but no outstanding opportunities for primitive and unconfined types of recreation. WIAs 01, 02, and 04 were found to contain supplemental values (fisheries, wildlife, ecological), whereas WIA 03 does not have supplemental values.

Wilderness Inventory Areas 01, 02, 03, and 04 all have substantial impacts that cover virtually the entire landscape for each WIA. Because of their small size and abundance of impacts that caused each of these 4 WIAs to be substantially unnatural and lacking of wilderness character, they were excluded from further study.

The remaining WIA (CA-330-05) initially totaled approximately 6,985 acres. Being over 5,000 acres in size meets the size criteria for designation as a Wilderness Study Area (WSA). During the evaluation of naturalness, it was found that portions of the WIA along its boundary had been extensively disturbed, almost entirely by past timber harvesting activities, including road building, construction of landings, and formation of skid trails. Preliminary inventories of disturbed areas indicate that at least 45 miles of former logging roads are located in the WIA. This does not include the many miles of skid trails that traverse the landscape. In addition, there are an estimated 135 developed stream crossings (culverts, stringer bridges, Humboldt crossings).

Because of these substantial unnatural features, three boundary adjustments were made to identify the parts of WIA 05 that appear natural and parts that do not. These three boundary adjustments, totaling 1,100 acres, reduced the size of the WIA to 5,885 acres. These adjustments were made to exclude substantial human impacts. Two of the parcels bordering the WIA have been identified as highly disturbed due to recent timber harvesting activities. The third parcel (Elk River Corridor) was excluded due to a variety of human impacts, including timber harvest activities and introduction of nonnative vegetation.

The 5,885-acre WIA contains approximately 3,100 acres of unharvested redwood forest preserved in its natural condition. The remaining portion of the WIA (2,785 acres) has been impacted by human-caused activities, but much of this area has returned to a condition such that the average visitor may not realize that the area has been disturbed. The WIA as a whole has been affected primarily by the forces of nature while the imprint of human work is substantially

unnoticeable. The WIA's large stands of old growth redwood forest, rugged topography, and dense vegetation provide outstanding opportunities for solitude. There are also outstanding opportunities for a primitive and unconfined hiking experience. Outstanding supplemental values include ecological (old-growth redwood forest and its abundance and diversity of old growth dependent plants and animal species), wildlife, fisheries, scientific, educational and historic features. Overall, WIA 05 meets all the minimum criteria for being designated a WSA.

Wilderness Study Evaluation

The one WIA (CA-330-05: Headwaters) found to possess the requisite wilderness characteristics as defined by the Wilderness Act of 1964 was further evaluated through the land use planning process to determine if it should be designated as a WSA. The other four WIA's were found to be substantially unnatural, lacking in wilderness character, not of sufficient size, and were therefore not studied further.

The Headwaters WIA was evaluated using regulations from 43 CFR 1600 and the BLM 1600 Manual and Handbook series to determine:

1. the overall quality and extent of wilderness values within the WIA;
2. other resource values and uses; and
3. the ability of BLM to manage the area as a WSA.

These elements were then used to determine the most appropriate land use allocations for the area, (i.e., whether the entire WIA should be designated as a WSA to be managed under the Interim Management Policy [IMP], BLM Handbook 8550-1 or whether a smaller, partial WSA alternative might be more appropriate). This information also provides a basis to compare the impacts of various WSA alternatives on other resource management programs and actions, which are discussed in chapter 6, "Environmental Consequences (Environmental Effects and Alternative Comparisons)."

Evaluation of Wilderness Values

The following information considers the extent to which the quality of the Headwaters WIA (CA-330-05) mandatory and optional wilderness characteristics contribute to the overall value of an area for wilderness purposes. This process aided in determining and documenting the quality of the identified wilderness characteristics, and the degree to which these characteristics are present in the WIA. These components must be evaluated in determining an area's value as a WSA.

Quality of the Area's Mandatory Wilderness Characteristics

Naturalness

The area generally appears to have been affected primarily by nature, with the imprint of human work substantially unnoticeable. The 3,100 acres of intact old growth forest shows very little sign that people have ever visited the area. The rugged topography and diverse vegetation creates a primeval environment. There are a few signs of human impact within this unharvested area.

There are varying degrees of quality of naturalness on the 2,785 acres of harvested land. On approximately 200 acres in the southwestern portion of the WIA in Sections 17, 18, and 20 is a clearcut area that was tractor-logged and shows no sign of naturalness. Many logging routes and skid trails are highly visible. Another smaller 40-acre parcel is in similar condition, located at the end of the existing Elk River Trail in Section 9. These two areas are termed “shrub harvested.” It will take at least 20 years before trees grow large enough to make these two areas appear to be in a somewhat natural condition to the common visitor.

Two additional areas totaling approximately 1,300 acres have been impacted by timber harvest activities, and they may appear to be in an unnatural condition to some visitors while appearing mostly natural to others. They are located in the southern portion of the WIA in Sections 18, 19, 20, 21, 22, 27, and 28. These areas are termed “pole-harvested,” and were logged in the mid-1980s. They appear in a more natural condition than the shrub harvested areas. The trees that remained after the logging and the new trees that have had time to grow have created a semi-natural condition.

The remaining timber harvest areas total approximately 1,000 acres and generally appear in a natural condition to the common visitor. Most of this land is located in the northern portion of the WIA in Sections 5, 8, and 9. Because, in most cases, these areas were logged more than 20 years ago, the landscape has rehabilitated into a natural condition while the effect of human work is substantially unnoticeable.

Imprinted portions of the WIA could be separated from the areas appearing more natural and untrammelled. The two shrub- harvested and two pole-harvested areas could be removed, or a lesser amount of acreage depending on which area selected to be excluded.

The overall influence of human imprints on the naturalness of the WIA is not substantial when considering the entire area as a whole from the viewpoint of the common visitor. As discussed above, two highly disturbed areas and two moderately disturbed areas do diminish the quality of the WIA’s natural condition.

Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

Although the WIA is relatively small in size, it does provide outstanding opportunities for solitude, particularly in the large stands of the old-growth redwood where the dense vegetation and rugged topography provide excellent visual screening. Although it is not necessary for wilderness inventory criteria to match visitor management criteria, visitors can easily find secluded spots within the old-growth forest. Finding solitude in the harvested areas is more difficult because there is less vegetation screening. The more recent the timber harvest occurred, the more difficult it is to find secluded spots.

Outside sights and sounds are present when adjacent landowners are performing timber harvest activities on their private property. Heavy mechanical equipment and chainsaws can be heard from at least two miles. Low-flying helicopters can be seen and heard when helicopter logging operations are occurring. These types of activities occur predominantly during the summer and early fall. They are not continuous, but occur periodically.

Primitive and Unconfined Recreation

Day-use hiking is currently the only activity where visitors are provided with an outstanding opportunity for a primitive and unconfined recreation experience. The last half of the Elk River Trail and the Salmon Creek Trail provide visitors with rewarding hiking experiences. The sights of the majestic old-growth redwood forest are outstanding. Bird-watching and other wildlife viewing opportunities are available along these two trails. Because hiking is currently the only recreation activity allowed in the WIA, the diversity of the area's primitive recreation opportunities is low.

Quality of the Area's Optional Wilderness Characteristics (Supplemental Values)

The WIA contains outstanding ecological values and features of scientific, educational, scenic and historic interest. The most outstanding ecological value is the unique, old-growth redwood forest and its abundance and diversity of plants and animal species that depend on the old-growth forest. The WIA holds important habitat for threatened animal species including the marbled murrelet, northern spotted owl, coho salmon, chinook salmon, and steelhead. The WIA has unique scientific and educational values because of the opportunities available to study an undisturbed old-growth redwood forest. Views of the huge, majestic redwood trees are excellent. Archeological sites and a historic trail are also located within the WIA.

Evaluation of Manageability

Much of the WIA can be effectively managed to preserve its wilderness character, both to maintain the quality of its wilderness characteristics and to ensure continuation of its current uses and multiple resource benefits. Most of the expected uses and activities within the WIA are consistent and meet the criteria for allowed uses in BLM's Interim Management Policy For Lands Under Wilderness Review, Handbook H-8550-1. These activities and management actions include watershed restoration work (logging route/way removal and recontouring to a natural topography), scientific research, resource monitoring, and a variety of low impact recreation activities. Allowed recreation uses must be consistent with fostering education and interpretation of the WIA's unique biological resources and maintaining ecological integrity and must be supportable with minimal facilities.

Management activities identified with the Forest Restoration program are not considered to be consistent with, and do not meet the criteria for allowed uses in WSAs. These actions include tree thinnings and brush removal in highly disturbed timber harvest areas.

A portion of the WIA's subsurface rights are owned by private parties. This situation limits BLM's ability to preserve the area's wilderness character on the surface. It is BLM's intent to acquire these subsurface rights, which would eliminate this conflict. The State of California has obtained a conservation easement over the entire WIA, which complements the WIA being managed to preserve its wilderness character.

There are no nonfederal holdings within the WIA; therefore, no manageability problems exist with providing access subject to valid existing rights.

Other Resource Values and Uses

Very few other resource values and uses of the area would be forgone or adversely affected as a result of designating the WIA a WSA. The proposed forest restoration program, which includes management actions such as small tree thinnings and brush removal in previously harvested areas, is not consistent with BLM's interim management policy for lands under Wilderness review. Resource values such as threatened or endangered plants and animals, fisheries, and other wildlife would benefit from designation of the area as a WSA. BLM has no plans to allow for timber harvesting, removal of forest fiber products, timber stand conversion, grazing operations, mining operations, issuance of new right-of-ways, oil, gas, geothermal, and mineral leases, prescribed burning, and recreational activities such as off-highway vehicle use, fishing, and hunting.

Wilderness Study Area Alternatives

After evaluating the quality of wilderness values, and in particular the degree of naturalness in various parts of the WIA, manageability, and other resources and uses, the potential for developing various WSA alternatives was explored and analyzed in chapter 6, "Environmental Consequences (Environmental Effects and Alternative Comparisons)." These alternatives are described below.

- Alternative A would designate the entire 5,885-acre WIA as a WSA. The WSA would include all the timber harvest areas, which reduces the quality of the area's natural condition. This alternative would preclude forest restoration activities such as small tree thinning and brushing. These activities are considered an important and necessary ingredient for accelerating and creating the conditions that lead to the development of an old growth forest. Outstanding opportunities for a primitive recreation experience would be maintained.
- Alternative B would designate the undisturbed, old-growth redwood forests, other unharvested forest, and the mid-mature and early mature harvested areas (these areas generally appear natural) as a WSA, totaling approximately 4,400 acres. The most heavily disturbed and unnatural-appearing areas would be excluded. There would be no conflicts with manageability or other resources and uses because this WSA would exclude all the lands where forest restoration projects would occur. Opportunities for a primitive recreation experience would be maintained.
- Alternative C, the "No Action" alternative, would not designate any portion of the WIA as a WSA. There would be no manageability concerns and opportunities for a primitive recreation experience would be maintained.

Appendix H. Wild and Scenic River Eligibility and Suitability Study

Appendix H. Wild and Scenic River Eligibility and Suitability Study

Wild and Scenic River System

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended) established a method of providing federal protection of our remaining free-flowing rivers and preserving them and their immediate environments for the use and enjoyment of present and future generations. Section 5(d)(1) of the Wild and Scenic Rivers Act provides that Wild and Scenic River considerations be made during federal agency planning. Congress may designate a river as part of the National Wild and Scenic Rivers System (NWSRS) or the Secretary of the Interior, upon the nomination of the Governor of the State of California, may approve the designation. Pursuant to this mandate, an evaluation of river resources within the Reserve has been conducted.

The NWSRS study process has three distinct steps:

1. Determine what rivers or river segments are eligible for NWSRS designation.
2. Determine the potential classification of eligible river segments as wild, scenic, recreational, or any combination thereof.
3. Conduct a suitability study to determine if the river segments are suitable for designation to the NWSRS.

Eligibility of Headwaters Streams

Each identified river segment was evaluated to determine whether or not it is eligible for inclusion in the NWSRS. To be eligible, a river segment must be “free-flowing” and must possess at least one “outstandingly remarkable value.” These values include

- scenic,
- recreational,
- geological,
- fish,
- wildlife,

- historic,
- cultural,
- ecological,
- riparian,
- botanical,
- hydrological, and
- scientific study.

No other factors were considered in determining the eligibility of a river segment. All other relevant factors are considered in determining suitability. A river need not be navigable by watercraft in order to be eligible. For purposes of eligibility determination, the volume of flow is sufficient if it is enough to maintain the outstandingly remarkable values identified within the segment.

The Reserve was created primarily to protect and preserve the ecological values of the unique, old-growth redwood forest community constituting the Headwaters Forest. Ecological values of the Reserve include unparalleled diversity of plant and animal species. The Reserve holds important habitat for threatened animal species including the marbled murrelet, northern spotted owl, coho salmon, chinook salmon, and steelhead.




The Reserve includes the headwaters of Salmon Creek and South Fork Elk River, both of which contain populations of coho and chinook salmon and steelhead (all three species are listed as threatened under the federal Endangered Species Act). Much of the portion of Salmon Creek located within the Reserve is dominated by old-growth redwood forest riparian area, abundant large woody debris, and deep pools. Much of the riparian forest along South Fork Elk River is dominated by red alder and willows. South Fork Elk River contains abundant pools, a moderate amount of large woody debris, and abundant spawning gravels in the lower reaches. Coho salmon, chinook salmon, steelhead, and coastal cutthroat trout spawn in this river. The main tributary within the Reserve is Little South Fork Elk River, which contains an impassible barrier for anadromous fish approximately 0.25 mile upstream from its confluence with South Fork Elk River. Three species of wildlife known to occur on or near the Reserve are listed as threatened or endangered—the bald eagle, northern spotted owl, and marbled murrelet. The papillose tail-dropper slug is a “Category 2” Survey-and-Manage species in the Northwest Forest Plan (USDA, USDI 1994) that has been detected in the Reserve.

Table H-1 lists the three rivers (or portions thereof) found in the Reserve, and describes why or why not they were determined to be eligible for inclusion in the NWSRS. The table provides information on river length, percent of river corridor under BLM jurisdiction, and identifies the outstandingly remarkable value(s) associated with each river. Corridor widths vary along the South Fork Elk River coincident with the public land boundaries. No private land is included within the corridor. Along the Little South Fork Elk River and Salmon Creek, the corridor width is 0.25 mile from each side of the streambanks.

All eligible river segments must be tentatively classified as either wild, scenic, or recreational to ensure appropriate protection of the values supporting the determination. These potential classifications are also shown in table H-1. Listed in table H-2 are more exact descriptions of each river segment’s location and a brief narrative of its outstandingly remarkable value(s). See also figure H-1.

Figure H-1
Streams in the Headwaters
Forest Eligible for Wild and
Scenic River Designation

Legend

- Reserve Boundary
- Eligible Streams
- Permanent Roads
-  Trailheads
-  Unharvested Forest
-  Harvested Forest

Elk River Trailhead

South Fork Elk River
 Segment 1

South Fork Elk River
 Segment 2

Little South Fork Elk River
 with Tributary

Salmon Creek

Salmon Pass
 Trailhead

Headwaters Forest Reserve
 Draft Management Plan/EIS/EIR



0 2000 4000 6000 ft

Scale = 1:54,000 (1 in = 4500 ft)

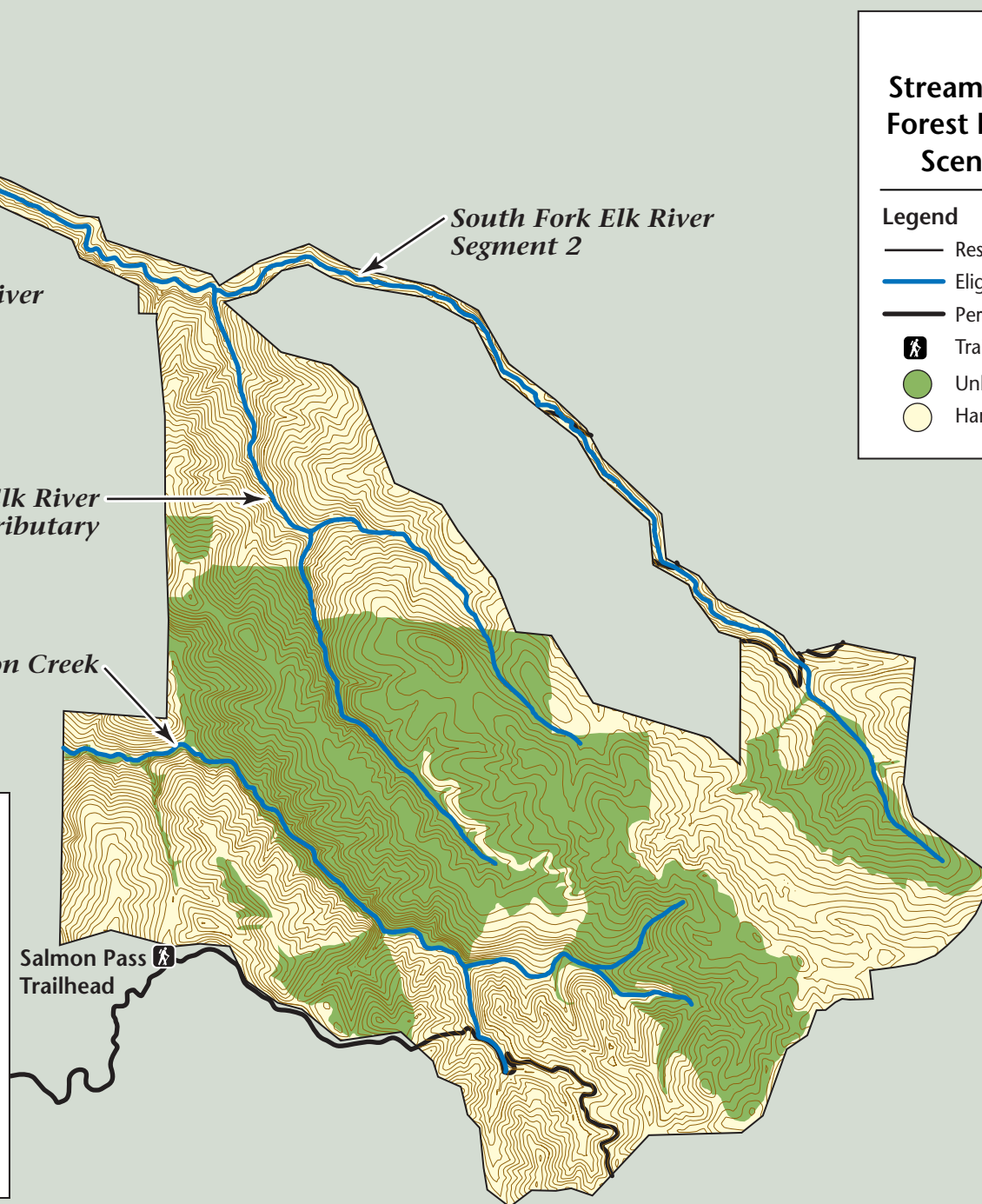


Table H-1. Eligibility of River Segments Eligibility Assessment for River Segments Identified for Possible Inclusion as Components of the National Wild and Scenic Rivers System

River Segment	Reason for Consideration ^a	Length (miles)		Free-Flowing	Outstandingly Remarkable Values ^b	Tentative Classification	BLM Jurisdiction	
		BLM	Other				Acres ^c	Portion of Corridor (%)
South Fork Elk River (Segment 1)	C, D	1.0	0.0	Yes	E, F, G, H,	Recreational	75	100
South Fork Elk River (Segment 2)	C, D	6.0	0.0	Yes	E, F, G, H	Scenic	450	100
Little South Fork Elk River with Tributary	C, D	5.0	0.0	Yes	E, F, I	Wild	1,600	100
Salmon Creek	C, D	5.0	0.0	Yes	E, F, I	Scenic	1,600	100

^a A - National Rivers Inventory
B - 1988 Outstanding Rivers List – American Rivers, Inc.
C - Potential Rivers Inventory – Arcata Field Office
D - Other

^b A - Nonexistent
B - Scenic
C - Recreational
D - Geological
E - Wildlife
F - Fish
G - Historical
H - Prehistoric
I - Ecological
J - Other

^c Shoreline and adjacent public lands within 0.25 mile of the river segment not to exceed 320 acres per mile measured from the ordinary high water mark on both sides of the river.

Table H-2. Outstandingly Remarkable Values of Eligible River Segments Eligibility Assessment for River Segments Identified for Possible Inclusion as Components of the National Wild and Scenic Rivers System

River Segment	Segment Description	Description of Outstanding Values
South Fork Elk River (Segment 1)	From the Reserve boundary just downstream from the Elk River Trailhead in Section 35, T4N, R1W, Humboldt Meridian (H.M.) to the old town site at Falk in Section 36, T4N, R1W, H.M.	Spawning habitat for indigenous chinook and coho salmon, and steelhead. Historic and prehistoric resources are located throughout the corridor.
South Fork Elk River (Segment 2)	From the old town site at Falk in Section 36, T4N, R1W, H.M. to the headwaters in Section 14, T3N, R1E, H.M.	Spawning habitat for indigenous chinook and coho salmon, and steelhead. Habitat for the northern spotted owl, marbled murrelet, and bald eagle exists nearby. Historic and prehistoric resources are located throughout the corridor.
Little South Fork Elk River with Tributary	From the confluence with the South Fork Elk River to the headwaters in Section 21, T3N, R1E, H.M. The tributary starts in Section 8, T3N, R1E, H.M. and ends in Section 15, T3N, R1E, H.M.	Spawning habitat for indigenous chinook and coho salmon, and steelhead for the first 0.25 mile. Old-growth redwood forest provides high-quality habitat for the threatened northern spotted owl and marbled murrelet, both of which nest in the area.
Salmon Creek	From the Reserve boundary in Section 18, T3N, R1E, H.M. to the headwaters in Sections 22 and 28, T3N, R1E, H.M.	Suitable spawning habitat for indigenous steelhead. Old-growth redwood forest provides high quality habitat for the threatened northern Spotted owl and marbled murrelet, both of which nest in the area.

Suitability of Headwaters Streams

River segments of the South Fork Elk River, Little South Fork Elk River, and Salmon Creek were found to be eligible for inclusion into the NWSRS. Section 4(a) of the Wild and Scenic River Act mandates that all rivers found eligible as potential additions to the NWSRS be studied as to their suitability for such a designation. The purpose of the suitability study is to provide information upon which the President of the United States can base his recommendation and Congress can make a decision. The study report describes the characteristics that do or do not make the area a worthy addition to the system, the current status of land ownership and use in the area, the reasonably foreseeable potential uses of the land and water which would be enhanced, foreclosed, or curtailed if the area were included in the system, and several other factors. The suitability study is designed to answer these questions:

- Should the river's free-flowing character, water quality, and outstandingly remarkable values (ORV) be protected, or are one or more other uses important enough to warrant doing otherwise?
- Will the river's free-flowing character, water quality, and ORVs be protected through designation? Is it the best method for protecting the river corridor? (In answering these

questions, the benefits and impacts of wild and scenic river designation must be evaluated, and alternative protection methods considered.)

- Is there a demonstrated commitment to protect the river by any nonfederal entities who may be partially responsible for implementing protective management?

Pursuant to Sections 4(a) and 5(c) of the Wild and Scenic Rivers Act, the following factors were considered and evaluated as a basis for the suitability determination for each river.

- Characteristics that do or do not make the area a worthy addition to the NWSRS.
- The current status of land ownership, minerals (surface and subsurface), and use in the area, including the amount of private land involved and associated or incompatible uses.
- The reasonably foreseeable potential uses of the land and water that would be enhanced, foreclosed, or curtailed if the area were included in the NWSRS.
- The federal agency that will administer the area should it be added to the NWSRS.
- The estimated cost to the United States of acquiring necessary lands and interests in lands and of administering the area should it be added to the NWSRS.
- A determination of the degree to which the state or its political subdivisions might participate in the preservation and administration of the river should it be proposed for inclusion in the NWSRS.
- An evaluation of the adequacy of local zoning and other land use controls in protecting the river's ORVs by preventing incompatible development.
- Federal, public, state, tribal, local, or other interests in designation or non-designation of the river, including the extent to which the administration of the river, including the costs thereof, may be shared by state, local, or other agencies and individuals.
- The consistency of designation with other agency plans, programs, or policies and meeting regional objectives. Designation may help or impede the "goals" of other tribal, federal, state or local agencies.
- The contribution to the river system or basin integrity.
- The ability of BLM to manage the river segments under designation, or ability to protect the river area other than Wild and Scenic River designation.

Characteristics That Do or Do Not Make the River Segments Worthy Additions to the NWSRS

The two river segments (two segments of South Fork Elk River, Little South Fork Elk River, and Salmon Creek) are located within the California Coast Range Physiographic Province. There are currently five designated Wild and Scenic Rivers within this province. They include portions of the Smith River, Klamath River, Main Stem Eel River, Van Duzen River, and the entire South Fork Eel River. This amounts to a total of approximately 150 miles. Because the South Fork Elk River, Little South Fork Elk River, and Salmon Creek total only about 17 miles, addition of these relatively small river segments would not substantially benefit the NWSRS as a whole.

The Nationwide Rivers Inventory has not identified the South Fork Elk River, Little South Fork Elk River, or Salmon Creek as possessing values of national significance.

The four river segments have several outstandingly remarkable values, including the 3,100-acre old-growth redwood forest that provides habitat for the threatened northern spotted owl, marbled murrelet, coho and chinook salmon, and steelhead. Although there is suitable habitat for these fish in Salmon Creek, none of the fish mentioned above have been observed during the last two years along this particular river segment. On the Little South Fork Elk River, even though spawning habitat exists, only steelhead have been observed in this river segment, and only for 0.25 mile from its confluence with the South Fork Elk River. Observations of chinook and coho salmon, and steelhead have been observed along nearly all the South Fork Elk River segment.

The 3,100 acres of old-growth redwood forest have been identified as an outstandingly remarkable ecological value. One of the primary reasons for this conclusion is that less than 5% of the original acreage of old-growth redwood forest within the California Coast Range Physiographic Province remains today. The 3,100 acres within the Reserve are estimated to make up approximately 5% of the total acreage of existing old-growth redwood forest within the province. Most of the old-growth redwood forests are located within Redwood National Park and several state parks.

Current Uses and Land Ownership Concerns

The four river segments and identified corridors are all public lands managed by BLM. The State of California has a conservation easement that covers the river segments. This easement provides a mechanism whereby the California Department of Fish and Game can ensure that the management of the Reserve meets the goals and objectives for which it was acquired. This easement provides for and encourages the two agencies to work collaboratively to ensure the protection of natural aquatic and terrestrial habitats, particularly the old-growth redwood forest and habitats for threatened and endangered species.

Most of the mineral rights in the Reserve are owned by parties other than BLM. These mineral rights are in the process of being acquired. In the interim, it is anticipated that none of the mineral rights will be developed, due to the presence of threatened and endangered species.

No water development, water right, or instream flow concerns exist.

Current uses along the river segments include research, monitoring, day hiking, and watershed rehabilitation that involves restoring old logging roads into a naturally appearing landscape. A small parking area has been developed at the downstream end of the South Fork Elk River segment. Visitors hike along South Fork Elk River segment for the first 3 miles, along Little South Fork Elk River for nearly two miles, and along Salmon Creek for 1 mile. No other recreational activities are currently allowed along these river segments.

Three roads and four bridges are in the upstream area of the South Fork Elk River. PALCO has obtained rights-of-way to use and maintain these roads and two bridges for access across the river to private property. The corridor along this portion of the South Fork Elk River was reduced in size to exclude adjacent private land. This landowner is not in favor of including any of its property within the corridor, as it could curtail or alter its plans to harvest timber from the area.

One unmaintained bridge crosses the Little South Fork Elk River and another unmaintained bridge crosses Salmon Creek.

Resources and Uses That Would Be Enhanced or Curtailed by Designation

The four river segments are located within the Reserve. This 7,400-acre Reserve was created primarily to protect and preserve the ecological values of the unique, old-growth redwood forest community constituting the Headwaters Forest. Federal legislation for the purchase and creation of the Reserve established the management goal “To conserve and study the land, fish, wildlife, and forests occurring on such land while providing public recreation opportunities and meeting other management needs.” Because the natural resources within the four river segments are fully protected under current policies and management direction, designation would neither enhance nor curtail resource values of the area. Designation would neither enhance nor curtail other uses of the river segments, such as recreation, because all existing and future visitor activities must be consistent with the protection and preservation of all aquatic and terrestrial habitats and ecosystems within the entire Reserve. No other uses, both existing or planned, would be enhanced or curtailed by designation.

Administration of the Area

The U.S. Department of Interior Bureau of Land Management (BLM) will administer the area should it be added to the NWSRS.

Costs of Acquiring Necessary Lands and Interests in Lands and of Administering the Area

If the area is added to the NWSRS, there would be no costs involved in acquiring necessary lands and interests in lands because all of the land within the river segments is public land managed by BLM. If the area were added to the National System, there would be a minor cost associated with developing a management plan and coordinating with adjacent private landowners to ensure their activities would not cause off-site (downstream or downslope) impacts that could degrade river values.

State or Political Subdivision Participation

The DFG jointly manages the Reserve with BLM. Administration of the river segments, if they were designated, would require active participation by this state agency.

Local Zoning and Other Land Use Controls

All lands within the river segments are federal public lands where local zoning or other land use controls do not apply.

Federal, Public, State, Tribal, Local, or Other Interests in Designation or Nondesignation

BLM held public scoping sessions to solicit concerns, ideas, and proposals for long-term management of the Reserve. The record indicates that issues or concerns related to Wild and Scenic River designation and management were not mentioned by the public during the scoping process. No federal, public, state, tribal, local, or other interested parties have commented or expressed any interest in designating or not designating any rivers within or nearby the Reserve as components to the National System.

Consistency of Designation with Other Agency Plans, Programs, or Policies, and Meeting Regional Objectives

Designation would be consistent with BLM's primary management responsibility to protect and preserve the ecological values of the aquatic and terrestrial habitats within the Reserve.

Contribution to the River System or Basin Integrity

Salmon Creek

The entire length of Salmon Creek is approximately 13 miles. The eligible river segment is nearly five miles in length, or 38% of the total river mileage. This river segment is located in the headwaters of the watershed, and existing and planned uses within the corridor (road restoration, slope stabilization projects, weed removal) would contribute to the protection and enhancement of aquatic habitats downstream. Much of Salmon Creek downstream has been heavily impacted over many years by timber harvesting activities. Several blockages in this area prevent salmon and steelhead from migrating upstream and spawning within the river segment. Only until recently have the lumber companies been actively involved in watershed rehabilitation work similar to the activities that BLM is conducting in the Reserve. Downstream from the forested lands is some privately owned agricultural land; the Humboldt Bay National Wildlife Refuge is farther downstream. Expanding the river segment, if it were designated, to include the private lands downstream or developing a legislative proposal for the entire river system from its headwaters to mouth would probably meet with opposition.

South Fork Elk River

The entire length of South Fork Elk River is approximately 10 miles. The two river segments eligible for designation total nearly seven miles, or 70% of the total river mileage. The river flows into Elk River, which extends for roughly 10 miles and enters Humboldt Bay. The river segments are located in the middle and upper reaches of the watershed, and existing and planned uses within the corridors (trail maintenance, slope stabilization projects, weed removal) would contribute to the protection and enhancement of aquatic habitats downstream. Much of the watershed has been harvested for timber. New timber harvest activities upslope from river segment 2 are planned. Downstream from river segment 1 are numerous residences and agricultural activities. Expanding the river segment, if it were designated, to include the private lands downstream and upslope lands outside of the corridor, or developing a legislative proposal for the entire river system or watershed would probably meet with opposition.

Little South Fork Elk River

The entire length of Little South Fork Elk River, approximately five miles, is eligible for system inclusion. This river is a tributary to South Fork Elk River, which is a tributary to Elk River. The river segment is located in an area of relatively undisturbed old-growth redwood forest, and existing and planned uses within the corridor (road restoration, slope stabilization projects, weed removal) would contribute to the protection and enhancement of aquatic habitats downstream. Considering the relatively small size of this river segment and drainage area compared to the Elk River drainage area, designation would not contribute a substantial amount to the basin's integrity.

Ability to Manage or Protect the River Area Other Than Wild and Scenic Designation

BLM could effectively manage the four river segments as components of the NWSRS. No current or planned management actions would be precluded from designation. However, there would be no substantial benefits from designation because BLM will continue to manage the Reserve to fully preserve and protect all the river segments identified outstandingly remarkable values. Much of the Reserve is recommended for designation as a Wilderness Study Area, and BLM's Interim Management Policy for Lands Under Wilderness Review are generally more restrictive with respect to allowable uses and activities. The entire Reserve is also protected by congressional designation and has been recommended to be designated an Area of Critical Concern.

Suitability Alternatives

Various combinations and alternative classifications of river segments were considered for designation, but after a thorough evaluation of the all the factors mentioned above, it was determined that two viable options exist: 1) recommend all eligible segments as suitable, and 2) recommend all eligible segments as unsuitable.

These 2 alternatives were analyzed further with respect to the impacts of Wild and Scenic River designation on several resource management programs. These programs include

1. watershed restoration;
2. forest restoration;
3. recreation;
4. fire management;
5. aquatic and terrestrial habitats and species; and
6. research and monitoring.

Refer to chapter 6, "Environmental Consequences (Environmental Effects and Alternative Comparisons)," for information on this impact analysis.

Recommendation

BLM and DFG recommend that all four river segments not be designated as components to the NWSRS.

The four river segments' free-flowing character, water quality, and outstandingly remarkable values should and will continue to be fully preserved and protected because of Reserve designation. No other resource uses outweigh the importance of protecting the identified river values. Designation is not the best method for protecting the river corridor because alternative protection methods already exist and are currently being implemented pursuant to federal legislation that created the Reserve. This legislation directs BLM to protect and enhance aquatic and terrestrial habitats and ecosystems within the Reserve. As mentioned previously in chapter 4, the EIS recommends that the Reserve be designated an Area of Critical Environmental Concern and that much of the Reserve be designated a Wilderness Study Area.

Other findings, including those listed below, were considered and evaluated to reach the aforementioned recommendation.

7. There are currently five designated Wild and Scenic Rivers totaling approximately 150 miles within the California Coast Range Physiographic Province. These designated rivers protect more intact river systems and are superior examples of the remarkable values identified in the Reserve.
8. All the segments but Salmon Creek are tributaries of a larger river which is neither designated nor been found eligible for inclusion in the NWSRS.
9. There was no public interest expressed about Wild and Scenic River designation during the scoping process.

Appendix I. State of California Ecological Reserve Regulations

Appendix J. Alternatives Considered But Eliminated

Appendix J. Alternatives Considered But Eliminated

Introduction

In addition to the management alternatives described in chapter 5, several additional alternatives were initially formulated and considered during the plan development process. Each of these additional alternatives were subsequently determined to be infeasible, imprudent, without significant benefit, or inconsistent with the legislation creating the Reserve (chapter 2). These alternatives, and the reasons for which they were dismissed from further consideration, are described in this appendix.

High-Intensity Forest Restoration

Under this alternative, density management could be conducted in all previously harvested stands (i.e., in early-mature and older seral-stage harvested stands, in addition to the pole and sapling stands and openings that would be treated in the Moderate-Intensity Forest Restoration alternative). These older later seral stages, the “early-mature” and “older” stands, are characteristic of conditions found in oldest harvested areas within the Reserve. In these stands the average tree stem diameters generally exceeds 14 inches, average tree heights generally exceed 60– 80 feet, and average tree age generally exceeds 30 years.

This alternative was rejected from further consideration because thinning of these later seral-stage harvested stands will either create unacceptable fuel loading if on-site reduction is utilized or require road and landing development for biomass removal. Moreover, such older stands are not highly responsive to thinning. Tree removal in these older stands will maintain growth but may not significantly affect tree and stand attributes such as crown and canopy development. Therefore, this alternative would do little to accelerate the development of old-growth characteristics, which is the primary purpose of the forest restoration program.

South Fork Elk River Trail Extension

The development of a new trail along the South Fork Elk River upstream of the confluence with the Little South Fork was originally considered for inclusion in all of the trail system alternatives (Alternatives 4A, 4B, and 4C). Such a trail would be a dead-end spur trail 0.5–1 mile in length along the north bank of the river within the narrow corridor that is part of the Reserve. It was

considered for use by hikers, bikers, and equestrians. It would have provided an additional river and riparian woodland experience, but not an experience of old-growth forest.

This alternative was eliminated from detailed consideration because the narrowness of the public land corridor containing it would entice visitors to trespass on privately owned industrial timberlands where logging operations are ongoing. It would also be subject to frequent overflights by low-flying logging helicopters, subjecting users to noise and potential injury.

Bicycle Use on All Trails

The use of bicycles on all trails of the selected trail system was originally considered. Several of the trails considered for use or development under some alternatives would involve relatively steep gradients and, in some cases, switchbacks. Where road-to-trail projects are not possible, the new trails must be built with minimal widths to maintain ecological integrity (chapter 2). These trails would be intended to provide users with recreation access to old-growth ecosystems in the Reserve and would not be intended for sporting purposes. The use of bicycles on these steeper or narrow trails would be a hazard to other trail users (i.e., hikers, or, in some alternatives, equestrians). The use of bicycles on such narrow, steep trails would also harass or create hazards to the Reserve's wildlife. Bicycle use, if allowed in the Reserve, must be limited to gently sloping trails, where high speed is least likely (e.g., Elk River Corridor trail), or at least to wide trails, where visibility and opportunity to avoid collision is improved. Accordingly, the alternative of bicycle use on all trails was eliminated from further consideration.

Equestrian Use of the Southern Access

The development of facilities at the Salmon Creek Trailhead or Alicia Pass to accommodate equestrian activities was initially considered during alternatives formulation. It was eliminated from detailed consideration because terrain suitable for the construction of parking for horse trailer loading and unloading at these ridgetop locations is limited. A large volume of earth would be moved and graded to develop such facilities anywhere along the southern access road. Parking facility development would therefore involve constructing more-than-minimal facilities for access to the Reserve, which is prohibited by the authorizing legislation.

State of California Wildlife Management Area Designation

Designation of the Reserve as state wildlife management area (WMA) under Fish and Game Code section 1525-1530 was initially considered but eliminated in favor of consideration of state ecological reserve designation. WMAs are managed primarily to enhance the production of game species, while the management intent for the Reserve is to nurture and allow natural processes to operate at natural rates. According to the authorizing legislation, the Reserve is intended to be managed as an ecological reserve.

Appendix K. List of Preparers

Appendix K. List of Preparers

This combined draft management plan and environmental impact statement/environmental impact report was prepared for the U.S. Department of Interior Bureau of Land Management, Arcata Field Office, by Jones & Stokes of Sacramento, CA.

Kenneth Casaday, Project Manager, is a geophysicist, stream restorationist, and natural resource management planner. For over 25 years he has prepared technical evaluations in the geomorphic, hydrologic, and riparian-ecology disciplines, and has directed multidisciplinary teams in preparation of land and resource restoration and management plans and impact assessments. Mr. Casaday received an A.B. in geology and geophysics in 1965 and an M.A. in geology and geophysics in 1967 at the University of California and was advanced to candidacy for a Ph.D. in geophysics in 1968.

Stephen Holl, Senior Wildlife Biologist, is a wildlife biologist with more than 17 years of experience in natural resource management. Mr. Holl received an M.S. in vertebrate biology from California State University, Fresno, California, in 1976, and a B.S. in wildlife and fisheries biology from the University of California, Davis in 1973.

Steve Daus, Ph.D., Senior Forest Ecologist, is a registered professional forester with more than 20 years of experience analyzing the cumulative impacts of timber operations. Mr. Daus received a Ph.D. in ecological systems analysis from the University of California, Davis, in 1979; and an M.S. in wildland resource science and a B.S. in forestry from the University of California, Berkeley, in 1974 and 1972, respectively.

Trevor A. Burwell, Ph.D., Botanist, is a broadly-trained geographer with experience in biogeography, forestry, landscape ecology, geomorphology, environmental history, and human impacts on the environment. Dr. Burwell earned his Ph.D. in Geography at the University of Wisconsin in 1999, and his M.A. in Geography from the University of California, Davis in 1993.

Steven Avery, Wildlife Biologist, has extensive experience in wildlife surveys, impact assessment, and mitigation planning. Mr. Avery received his M.A. in biology from the University of Northern Colorado, Greeley, Colorado, in 1990, and a B.S. in zoology /wildlife biology from Ohio University, Athens, Ohio, in 1985.

Jeffrey Kozlowski, Fisheries Biologist, has more than 12 years of professional experience. Mr. Kozlowski received a B.S. in natural resources management (emphasis in fisheries management) from California Polytechnic State University, San Luis Obispo, in 1986 and is completing his M.A. in ecology at the University of California, Davis.

Brook Vinnedge, Wildlife Biologist, has five years professional experience as a wildlife biologist. She received her M.S. in Environmental Science from Washington State University, Pullman, in 1996, and a B.A. in Psychology from the University of California, Berkeley in 1990.

Selene Jacobs, Conservation Planning Project Coordinator, has coordinated conservation and management plans for numerous projects throughout the state of California. Ms. Jacobs received her M.S. in Conservation Biology and Sustainable Development from the University of Wisconsin, Madison in 1998, and her B.S. in Environmental Science, Policy and Management from the University of California, Berkeley in 1995.

Appendix L. Individuals and Organizations Receiving Notice of This Document

Table L-1. Individuals and Organizations Receiving Notice of this Document

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Acord	Tom	Redwood Unit of Back Country Horsemen	2054 Tomkins Hill	Loleta	CA	95551	707-725-9018	
Adams	Stephen		2551 Acheson Way	Arcata	CA	95521		
Agredano	Rene	Agreda Communications	2104 Excelsior Rd.	Eureka	CA	95501	707-269-0400	rat@agreda.com
Ahern	Tim	Bureau of Land Management	1849 C St NW	Washington	DC	20240		
Amado	Bruce		235 W. Washington	Eureka	CA	95501-1668		
Ammerman	David	U.S. Army Corps of Engineers	P.O. Box 4863	Eureka	CA	95502	707-443-0855	dammerman@smtp.spd.usace.army.mil
Anderson	Rob	Public Access To Headwaters (P.A.T.H.)	1666 Grove St.	San Francisco	CA	94117	415-921-1931	
Anderson	Christy	Sacramento Open Space	633 44th St.	Sacramento	CA	95819		christya@jsanet.com
Appel	Larry		155 Fern Lane	Crescent City	CA	95531		
Arcata City Manager		Arcata City Manager	736 F Street	Arcata	CA	95521	707-822-8184	
Arcata Community Recycling Center		Arcata Community Recycling Center	1380 Ninth Street	Arcata	CA	95521	707-822-8512 or 822-1212	
Arcata Economic Development Corp.		Arcata Economic Development Corp.	100 Ericson Court, Suite 100	Arcata	CA	95521	707-822-2323	
Audubon Society_Redwood Region Chapter		Audubon Society Redwood Region Chapter	P.O. Box 6343	Eureka	CA	95502	707-445-2043	
Avcollie	Michael		1271 C Street	Arcata	CA	95521		
Avenue Trails Committee		Avenue Trails Committee	P.O. Box 355	Miranda	CA	95553		sandi326@aol.com
Backcountry Horsemen Association		Backcountry Horsemen Association	2464 Tower Drive	Eureka	CA	95503		
Backcountry Horsemen Of CA Redwood Region		Backcountry Horsemen Of CA Redwood Region	1560 Zeus Road	McKinleyville	CA	95519		
Bailey	Kathy	Sierra Club California	PO Box 256	Philo	CA	95466		
Ball	Frank		PO Box 2006	McKinleyville	CA	95519		
Barrow	Shane	Bureau of Land Management	5309 L St.	Sacramento	CA	95819	916-452-7219	
Barrow	Anne		5309 L St.	Sacramento	CA	95819	916-452-7219	
Baumeister	Carol		3217 Madison Street	Alameda	CA	94501		
Baumgartner	Louise D.		1425 Waller Street #4	San Francisco	CA	94117		
Beck	Dianne	Sierra Club North Group	P.O. Box 238	Arcata	CA	95518-0238		
Beers	Don	California Dept. of Parks and Recreation	P.O. Box 2006	Eureka	CA	95502	707-445-6547	dbeer@parks.ca.gov
Beginnings		Beginnings	P.O. Box 1090	Redway	CA	95560	707-923-3617	

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Ben Aryeh	David		PO Box 3033	Rohnert Park	CA	94927		
Bettis	Rick	Sierra Club, League of Women Voters	1716 P. St.	Sacramento	CA	94244	916-442-5775	rickb@antonnet.com
Bevington	Doug	John Muir Project Of Earth Island	1770 Broadway #303	Oakland	CA	94612		
Bisson	Henri	Bureau of Land Management	1849 C St NW	Washington	DC	20240		
Bixby	William		2120 Stockton #201	San Francisco	CA	94133		
Black	Cory		2222 Gateway Oaks Drive	Sacramento	CA	95833		
Bliss	Bill	CA Recreational Trails Committee	1849 Dry Creek Road	San Jose	CA	95124-1072	408-377-4776	
Blomquist	Brad	Bureau of Land Management	1849 C St NW, Rm 401 LS	Washington	DC	20240		
Blue Lake City Council		Blue Lake City Council	P.O. Box 458	Blue Lake	CA	95525	707-668-5655	
Blue Lake Trails Group		Blue Lake Trails Group	P.O. Box 521	Blue Lake	CA	95525	707-668-1601	
Blyther	Ruth	Natural Resources Services, RCAA	904 G Street	Eureka	CA	95501	707-269-2066	nrs@rcaa.org
Boddington	Celia	Bureau of Land Management	1849 C St NW, Rm 406 LS	Washington	DC	20240		
Bonbion	Elizabeth A.		1805 Divisadero Street	San Francisco	CA	94115		
Boughton	Mary Shivley		814 J St.	Eureka	CA	95501	707-443-3667	
Breen	Ingen		1601 Shoreline Highway	Sausalito	CA	94965		
Bridges	Bob		8132 Firestone Blvd.	Downey	CA	90241		
Broadlink.Com		Broadlink.Com	409 Mendocino Avenue, Suite 3	Santa Rosa	CA	95401-8513		
Brodesser	Mark	U.S. Bureau of Land Management	1695 Heindon Road	Arcata	CA	95521	707-825-2321 or 825-2300	
Brooks	Eric	Forests Forever	973 Market St. #450	San Francisco	CA	94103	415-365-4609	brooks@igc.org
Brooks	Karen	Redwood Empire Endurance Riders (REER)	PO Box 292	Bayside	CA	95524	707-822-7736	kbrooks@humboldt1.com
Brown	Josh	North Coast Earth First!	PO Box 28	Arcata	CA	95518	707-825-6598	ncef@humboldt1.com
Bruce	Amy			Fieldbrook	CA		707-826-2869 wk, 839-2242 (hm)	water@humboldt1.com
Bruce	Deborah		839-B Capp St	San Francisco	CA	94110		
Bryant	Greg	N.O.A.A. National Marine Fisheries Service	1655 Heindon Rd.	Arcata	CA	95521	707-825-5162	greg.bryant@noaa.gov
Bundy	Burton		25585 Lincoln St	Los Molinos	CA	96055		
Burkett	Esther	California Dept. of Fish and Game	1416 9th Street	Sacramento	CA	95814	916-653-2588	75471.1662@compuserve.com

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Burton	Tim	Dept. of Fish and Game			CA			
Butler	Max		854 15th Street	Fortuna	CA	95540		
Butterfield	Lisa		1105 Seventh Street	Eureka	CA	95501		
CA Dept. of Fish and Game	Robert Hight,	CA Dept. of Fish and Game	1416 9th Street	Sacramento	CA	94244-2090	916-654-5628	
CA Dept. of Fish and Game	Paul Wertz,	CA Dept. of Fish and Game	601 Locust Street	Redding	CA	95001	530-225-2300	
CA Dept. of Fish and Game	Karen Kovacs,	CA Dept. of Fish and Game	619 Second Street	Eureka	CA	95501	707-441-5789	kkovacs@dfg.ca.gov
CA Dept. of Forestry	Dave Ebert,		118 Fortuna Blvd.	Fortuna	CA	95540		
CA Off-Road Vehicle Association	Don Klusman,	CA Off-Road Vehicle Association	2916 Coy Drive	Yuba City	CA	95993-8855		
CA Regional Water Quality	Lee A. Michlin,	CA Regional Water Quality	5550 Skylane Blvd, Suite A	Santa Rosa	CA	95403		
Calif Wilderness Coalition	Ryan Henson,	Calif Wilderness Coalition	PO Box 293	Shingleton	CA	96088		
California Conservation Corps		California Conservation Corps	1500 Alamar Way	Fortuna	CA	95540	707-725-5105 or 725-5106	
California Horsemens Association	Barbara North,	California Horsemens Association	PO Box 740	Loleta	CA	95551		
California Trails and Greenways		California Trails and Greenways	411 Los Ninos Way	Los Altos	CA	94022-1726	650-948-1829	
Cameron	Bruce		647 Beverly Dr.	Arcata	CA	95521		
Campbell	Bruce		614 Grenta Green Way	Los Angeles	CA	90049		
Carlson	Andrew E.		3031 Dolbeer St.	Eureka	CA	95501	707-443-2951	
Carr	Robert & Janet		5756 Florence Terrace	Oakland	CA	94611		
Carrilla	Paul	California Coastal Conservancy	11344 Coloma Rd.	Gold River	CA		916-464-0410	
Carroll Sr.	Lionel	Bear River & Rohnerville Rancheria	32 Bear River Dr.	Loleta	CA	95551		
Carter	Mark	Carter House	301 L Street	Eureka	CA	95501		
Casaday	Ethan	Casaday Construction	1510 Chester Avenue	Arcata	CA	95521	707-825-7027	emc2@axe.humaboldt.edu
Castellini	Edgar M.	World Stewardship Institute	409 Mendocino Avenue, Suite A	Santa Rosa	CA	95401		
Center For Biological Diversity	Kassia Siegel,	Center For Biological Diversity	PO Box 40090	Berkeley	CA	94704-4090		
Chase	Jennifer		1196 Anderson Ln.	Arcata	CA	95521	707-822-9652	
Chin	Steven		1463 34th Ave.	San Francisco	CA	94122	415-290-7689	
Chomistek	Paula		3544 I Street	Eureka	CA	95503		
Christianson	Steve		740 E St.	Eureka	CA	95501	707-268-3800	
Circuit Riders		Circuit Riders	9619 Old Redwood Highway	Windsor	CA	95492	707-838-6641	

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
City of Arcata Planning Commission		City of Arcata Planning Commission	736 F Street	Arcata	CA	95518	707-822-5955	
City of Eureka		City of Eureka	531 K Street	Eureka	CA	95501	707-441-4163	
City of Eureka Community Development		City of Eureka Community Development	531 K Street	Eureka	CA	95501	707-441-4265	
City of Eureka Planning Commission		City of Eureka Planning Commission	531 K Street	Eureka	CA	95501	707-441-4265	
City of Eureka Public Works		City of Eureka Public Works	531 K Street	Eureka	CA	95501	707-441-4180	
City of Ferndale		City of Ferndale _City Manager	P.O. Box 1095	Ferndale	CA	95536-1095	707-786-4224	
City of Fortuna		City of Fortuna	P.O. Box 652	Fortuna	CA	95540	707-725-9305	
City of Fortuna Planning Commission		City of Fortuna Planning Commission	P.O. Box 545	Fortuna	CA	95540	707-725-7600	
City of Rio Dell		City of Rio Dell _City Manger	675 Wildwood Avenue	Rio Dell	CA	95562	707-764-3532	
Clayton	Serena		6932 Ridgewood Drive	Oakland	CA	94611		
Cleary	Kathleen		1604 R Street	Eureka	CA	95501	707-442-2465 (hm) 442-2465 (wk)	
Clifford	Patti		2145 Heather Lane 2	Arcata	CA	95521		
Clifton	Spencer	Humboldt County Association of Governments (HCAOG)	235 Fourth Street	Eureka	CA	95501	707-444-8208	
Coastal Conservation Committee		Coastal Conservation Committee	P.O. Box 930	Mendocino	CA	95460	707-937-4376	
Coastal Headwaters Association		Coastal Headwaters Association	P.O. Box 12	Whitethorn	CA	95589	707-923-2931	
Coastal Stream Restoration Group		Coastal Stream Restoration Group	53 Kingston Road	Fieldbrook	CA	95519	707-839-8238	
Coastwalk		Coastwalk	1389 Cooper Road	Sebastopol	CA	95472	707-829-6689 or 800-550-6854	coastwalk@sonic.net
Cochrane	Andy		675 Eight Ave. #A	Trinidad	CA	95570		
Colusa County Board Of Supervisors		Colusa County Board Of Supervisors	546 Jay Street	Colusa	CA	95932		
Colusa County Board Of Supervisors		Colusa County Board Of Supervisors	44 Walnut Tree Ct.	Colusa	CA	95932		
Community Health Systems Dept.	Daniel Halperin,	Community Health Systems Department	University Of California	San Francisco	CA	94143		
Conlee	May		6162 Avalon Drive	Eureka	CA	95501	707-269-2053	
Conlon	Tom	City of Arcata Planning Dept.	736 F Street	Arcata	CA	95521	707-822-5955	
Cooksley Geophysics	James W.	Cooksley Geophysics	4810 Alta Mesa	Redding	CA	96002		

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
	Cooksley,							
Corbett	Katheryn		901-A 14th Street	Arcata	CA	95521-5508		
Crowl	Doug and Kathy		3699 Newburg Road	Fortuna	CA	95540		
Cuilla	Paulette	Serving The Earth Committee	5656 23rd St.	Sacramento	CA	94244		
Cummings	Earle	CA Dept. of Water Resources Environmental Services Division	P.O. Box 942836	Sacramento	CA	94236-0001	916-227-7519	earlec@cd- eso.water.ca.gov
Deignan	Robb	Folsom-Auburn Trail Riders Action Coalition & IMBA	7730 River Village Dr.	Carmichael	CA	95608	916-391-8385	noendo@jps.net
Dept. of Forestry & Fire	Andrea Tuttle,	CA Dept. of Forestry and Fire Protection Forest Stewardship Program	P.O. Box 944246	Sacramento	CA	94244-2460	916-653-7772	
Dept. of Forestry & Fire	Louis Blomberg,	CA Dept. of Forestry and Fire Protection Forest Stewardship Program	P.O. Box 944246	Sacramento	CA	94244-2460	916-653-1586	
Desantis	Larry & Julie	Quality Saddles	2006 4th Street	Eureka	CA	95501		
Dietrich	Phil	U.S. Fish and Wildlife Service	1655 Heindon Rd.	Arcata	CA	95521		
Diperna	Rob		PO Box 28	Arcata	CA	95518		
Driscoll	Carol		1578 Fickle Hill Road	Arcata	CA	95521		
Eco-Watch Sonoma		Eco-Watch Sonoma	300 Ryan Rach Road	Sebastopol	CA	95472		
Ehresman	Dan	THS Watch	PO Box 626	Eureka	CA	95502	707-839-1534	
Ehrhardt	Robert		8502 Elk River Road	Eureka	CA	95503		
Elk	Joan		2534 Old Arcata Road	Bayside	CA	95524-9309		
Ellis	Barbara	Office of Assemblymember Strom- Martin	235 4th Street, Suite C	Eureka	CA	95501	707-445-7014	
Eloesser	Nina H.		2121 Lyon St.	San Francisco	CA	94115		
Env. Alliance for Senior Involvement		Environmental Alliance for Senior Involvement	8733 Old Dumfries Rd	Catlett	VA	22019	(540) 788-3274	easi@easi.org
Environmental Health Division	Humboldt County Health Dept.	Humboldt County Health Dept. Environmental Health Division	100 H Street, Suite 100	Eureka	CA	95501	707-442-6215	
EPIC	Kevin Bundy	Environmental Protection Information Center (EPIC)	P.O. Box 397	Garberville	CA	95542	707-923-2931	epic@wildcalifornia.org
Erickson	Karen		1975 Bent Tree Place	Santa Rosa	CA	95404		
ERWIG		Eel River Watershed Improvement Group (ERWIG)	610 9th Street	Fortuna	CA	95540	707-725-4317	
Eubanks	Kim	Newburg Rd. Residents	3655 Newburg Road	Fortuna	CA	95540	707-725-6064	kcel@humboldt.edu
Eureka City Council		Eureka City Council	531 K Street	Eureka	CA	95501	707-441-4172	
Eureka City Manager		Eureka City Manager	531 K Street	Eureka	CA	95501	707-441-4172	

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Eureka Main Street Program		Eureka Main Street Program	123 F Street, #6	Eureka	CA	95501	707-442-9054	
Evans	Larry	Earth First! North Coast California	PO Box 1273	Pinecrest	CA	95595364		
Fedder	Dick	Back Country Horsemen of Calif.	195 Wagon Jack Ln.	Arcata	CA	95521	707-822-6696	
Ferndale Chamber of Commerce		Ferndale Chamber of Commerce	P.O. Box 325	Ferndale	CA	95536-0325	707-786-4477	ebriggs@humboldt1.com
Ferndale City Hall		Ferndale City Hall	834 Main Street	Ferndale	CA	95536	707-786-4224	
Fiack	Linda	State Lands Commission_Rivers, Lakes and North Coast	100 Howe Avenue, Suite 100 South	Sacramento	CA	95825-8202	916-574-1900	
Fishery Foundation of California		Fishery Foundation of California	5200 Huntington Avenue Suite 300	Richmond	CA	94804	510-525-3474	
Flaiz	Bill		3640 Newburg Rd.	Fortuna	CA	95540		
Flanigan	Faith		932 Bayside Road	Arcata	CA	95521		
Fockens	Colman		1640 Union St.	Arcata	CA	95521	707-826-1086	
For the Sake of Salmon		For the Sake of Salmon	319 SW Washington, Suite 706	Portland	OR	97204	503-223-8511	
for Trails	Dan	International Mountain Biking Assoc.	PO Box 7578	Boulder	CO	80306-7578		
Forest Trust		Forest Trust	P.O. Box 519	Santa Fe	New Mexico	87504-0519	505-983-8992	foresttrust@igc.apc.org
Forestry Monitoring Project	Kent Stromsmoe,	G.D.I., Forestry Monitoring Project	2215 Pine Street	Martinez	CA	94553-2727		
Fortuna Business Improvement District		Fortuna Business Improvement District	610 Main St.	Fortuna	CA	95540	707-725-9261	
Fortuna Chamber of Commerce		Fortuna Chamber of Commerce	735 Fourteenth Street	Fortuna	CA	95540	707-725-3959	
Fortuna City Council		Fortuna City Council	621 11th Street	Fortuna	CA	95540	707-725-6125	
Fortuna City Hall	Mayor Phil Nyberg	Fortuna City Hall	621 11th Street	Fortuna	CA	95540	707-725-6125	
Fortuna City Manager	Dale Neiman,	Fortuna City Manager	P.O. Box 545	Fortuna	CA	95540	707-725-7600	
Franklin	Bill and Linda		21300 Santa Clara Ave.	Middletown	CA	95461		
Freshwater Creek Watershed Association		Freshwater Creek Watershed Association	8015 Kneeland Road	Kneeland	CA	95549	707-443-1139	
Freshwater Watershed Working Group		Freshwater Watershed Working Group	120 Pacific Lumber Camp Road	Eureka	CA	95503	707-444-8239	
Freyer	Arthur		2409 McKinley	Berkeley	CA	94703		
Friends of the Eel River		Friends of the Eel River	P.O. Box 2305	Redway	CA	95560	707-923-2146	
Friends of the River		Friends of the River	915 20th Street	Sacramento	CA	95814	916-442-3155	info@friendsoftheriver.org
Friends of the River	Steve Evans	Friends of the River	128 J Street, Second Floor	Sacramento	CA	95814		

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Frissell	Christopher A.	University of Montana-Flathead Lake Bio	University of Montana, 3 Bio Station Land	Polson	MT	59860-9659		
Fry	Tom	Bureau of Land Management	1849 C St NW, Rm 5600 MB	Washington	DC	20240		
Furman	Duane		5615 Scotts Valley Road	LakePort	CA	95453		
Gans	Laraine C.		3415 Renner Drive	Fortuna	CA	95540		
Garberville - Redway Chamber of Commerce		Garberville - Redway Chamber of Commerce	773 Redwood Dr. Suite E	Garberville	CA	95542	707-923-2613	
Gauthier	David		6626 Bret Hartel Lane	Eureka	CA	95501		
Gay	Michael and Vikki	Back Country Horsemens	1561 Port Kenyon Road	Ferndale	CA	95536		mbges@humboldt1.com
Genco	Maryjane		968 Apricot Avenue	Campbell	CA	95008		
Gerdel	Charles E.	FATRAC	2805 Occidental Dr.	Sacramento	CA	95819		cbgerdel@soft.com
Gibbons	Michael J.		4847 Airstream	Arcata	CA	95521		
Giddings	Evelyn		PO Box 9066	Eureka	CA	95502		
Giordano	Edward	Friends Of The Urban Forest	1260 17th Ave. #2	San Francisco	CA	94105	415-759-6320	
Girard	Kirk	Humboldt County Planning Dept.	3015 H Street	Eureka	CA	95501	707-445-7541	kgirard@co.humboldt.ca.us
Goodwin	Mary		PO Box 321	Calpella	CA	95418		
Goosby	Zuretti	Office of Senator Wes Chesbro	710 E Street, Suite 150	Eureka	CA	95501	707-445-6508	sandy.radic@sen.ca.gov
GrassRoots Env. Effectiveness Netwk		GrassRoots Environmental Effectiveness Network (GREEN)	P.O. Box 40046	Albuquerque	NM	87196-0046	505-255-5966	
Green	Patrick and Mary		3670 Newburg Road	Fortuna	CA	95540		
Groeling	Jim		P.O. Box 168	Petrolia	CA	95558		
Guzlas	Kyle		220 Grove Avenue	Prescott	AZ	86301		
Guzzi	Clark	Humboldt Surfriders Foundation	336 Shale Lane	Kneeland	CA	95549	707-445-1336 or 445-6098	
Gwynne	Bruce	California Regional Water Quality Control Board	5550 Skylane Boulevard, Suite A	Santa Rosa	CA	95403	707-576-2661	gwynb@rb1.swrcb.ca.gov
Gyenis	Melinna and Attila	Freshwater Watershed Working Group	2528 Freshwater Road	Freshwater	CA	95503	707-443-1345	
Halstead	Bruce	U.S. Fish and Wildlife Service	1655 Heindon	Arcata	CA	95521	707-822-7201 x	bruce_g_halstead@fws.gov
Hamblin	Kevin R.	City of Eureka Community Development	531 K Street	Eureka	CA	95501	707-441-4164	

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Hamilton	Patrick		177 Webster Street A3816	Monterey	CA	93540		
Hamrick	Milan		PO Box 2654	Redwood City	CA	94064-2654		
Hapner	Nina	Table Bluff Reservation Wiyot Tribe	1000 Wiyot Dr.	Loleta	CA	95551	707-733-5055	nina@wiyot.com, epa@humboldt1.com
Harden	Kay		101 Dunaway Court	Fortuna	CA	95540		
Harris	Steve		PO Box 341	Arcata	CA	95518		
Harrison	Debbie	Redwood Alliance	P.O. Box 293	Arcata	CA	95518	707-822-7884	
Hatfield	Rob		PO Box 533	Arcata	CA	95518		rjh3@humboldt.edu
Hauser	Jim		1449 NW Trenton	Bend	OR	97701		
HCRCD		Humboldt County Resource Conservation District (HCRCD)	5630 S. Broadway	Eureka	CA	95501	707-444-9708	
Headwaters		Headwaters	P.O. Box 729	Ashland	OR	97520	541-482-4459	headwtrs@mind.net or gwynalle@mind.net
Helleskov	Ole & Jo		2526 E. Vita Way	Sacramento	CA	95608	916-973-9969	
Helton	Steve		3685 Newburg Road	Fortuna	CA	95540		
Heppe	Chris	U.S. Environmental Protection Agency	1695 Heindon Road	Arcata	CA	95521	707-825-2311	heppe.christopher@epamail.epa.gov
Higbee	Dottie	Sierra Club	2013 Ceres Way	Sacramento	CA	95864		ceresway@juno.com
Higgins	Patrick	Patrick Higgins Consulting Fisheries Biologist	791 Eighth Street, Suite N	Arcata	CA	95521	707-822-9428	phiggins@humboldt1.com
Hill	Julia Butterfly		PO Box 388	Garberville	CA	95542		
Hinsch	Chuck		PO Box 463	Mendocino	CA	95460		
Hoffman	Jeff		132 B Coleridge	San Francisco	CA	94110		
Hofweber	Tom	Humboldt County Planning Dept.	3015 H Street	Eureka	CA	95501	707-445-7541 x 38	thofweber@co.humboldt.ca.us
Howe	Alan	B.A.C.H.	1815 Allston Way	Berkeley	CA	94703	510-897-5057 (w)	poethowe@yahoo.com
Hubbard	Ann	Friends of the Earth	705 15th St. #3	Eureka	CA	95503	707-268-0845	
Hull	David	Humboldt Bay Harbor, Recreation, & Conservation Dist.	P.O. Box 1030	Eureka	CA	95502-1030	707-443-0801	dhull@portofhumboldtba y.org
Humboldt Arts Council		Humboldt Arts Council	214 E Street	Eureka	CA	95501	707-442-0278	
Humboldt Bay Harbor, Recreation, & Conservation Dist.		Humboldt Bay Harbor, Recreation, and Conservation District	P.O. Box 1030	Eureka	CA	95502-1030	707-443-0801	
Humboldt Co. Convention & Visitors Bureau		Humboldt County Convention and Visitors Bureau	1034 Second Street	Eureka	CA	95501	707-443-5097 and 800-346-3482	info@redwoodvisitor.org

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Humboldt Coastal Coalition		Humboldt Coastal Coalition	1621 R Street	Arcata	CA	95521	707-822-5079	
Humboldt County Historical Society		Humboldt County Historical Society	703 Eighth Street	Eureka	CA	95501	707-445-4342	
Humboldt County R.C.D.		Humboldt County R.C.D.	PO Box 43	Scotia	CA	95565	707-445-7692 (wk)	
Humboldt Fish Action Council		Humboldt Fish Action Council	53 Kingston Road	Fieldbrook	CA	95519	707-839-8238	
Humboldt North Coast Land Trust		Humboldt North Coast Land Trust	P.O. Box 457	Trinidad	CA	95570	707-677-0716 (Ned)	
Humboldt/Trinity Recreation Alliance	Douglas Smith	Humboldt/Trinity Recreation Alliance	HC62 Box 30c	Zenia	CA	95595		
Hune	Sandra		2019 North Diamond	Orange	CA	92667		
Hunt	Mypon		1601 Shoreline	Sausalito	CA	94965		
Izaak Walton League of America_Save Our Streams Program		Izaak Walton League of America Save Our Streams Program	1401 Wilson Boulevard, Level B	Arlington	VA	22209	703-528-1818	
Jacoby Creek Land Trust		Jacoby Creek Land Trust	P.O. Box 33	Bayside	CA	95524	707-441-3566 or 677-0279	
Jamasek	Adam			Arcata	CA	95521	707-825-8671	
James Irvine Foundation		James Irvine Foundation	One Market St. Stuart Tower, Suite 2500	San Francisco	CA	94105	415-777-2244	
Johnson	Rosalyn	U.S. Environment Protection Agency	75 Hawthorne St.	San Francisco	CA	94105	415-774-1574	
Johnston	Riggs		2316 Maple Ln.	Eureka	CA	95501	707-443-2656	
Jones	Jeff		1051 Evans Ln.	Fieldbrook	CA	95519	707-839-8330	
Jones	Robert		2185 Greenwood Heights Dr	Kneeland	CA	95549		
Jones & Stokes Associates, Inc.	Steve Holl	Jones & Stokes Associates, Inc.	2600 V Street, Suite 100	Sacramento	CA	95818-1914	916-737-3000	
Jones & Stokes Associates, Inc.	Dan Airola	Jones & Stokes Associates, Inc.	2600 V Street, Suite 100	Sacramento	CA	95818-1914	916-737-3000	
Jones & Stokes Associates, Inc.	Dave Ceppos	Jones & Stokes Associates, Inc.	2600 V Street, Suite 100	Sacramento	CA	95818-1914	916-737-3000	
Jones & Stokes Associates, Inc.	Selene Jacobs	Jones & Stokes Associates, Inc.	2600 V Street, Suite 100	Sacramento	CA	95818-1914	916-737-3000	
Jones & Stokes Associates, Inc.	Ken Casaday	Jones & Stokes Associates, Inc.	2600 V Street, Suite 100	Sacramento	CA	95818-1914	916-737-3000	
Jungers	Jeanette	Humboldt Watershed Assoc.	1523 William St.	Eureka	CA	95501	707-443-3420	
Karhi	Christine		2544 Sutter St.	San Francisco	CA	94115		
Katlas	Ed		415 Zinfandel Dr.	Ukiah	CA	95482		
Keele	Scott		8080 Elk River Road	Eureka	CA	95503		
Kelly	Michael	International Mountain Biking Assoc.	523 Santa Barbara Rd.	Berkeley	CA	94707		
Kiesse	Matt	Humboldt Bay Watershed Coordinator	P. O. Box 8538	Truckee	CA	96162	530-550-0564	riverrun@sierra.net

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Kietzer	Ken		1775 Haight Street	San Francisco	CA	94117		
Klamath Forest Alliance		Klamath Forest Alliance	P.O. Box 820	Etna	CA	96027	530-467-5405	klamath@snowcrest.net
Klamath River Basin_Fisheries Task Force		Klamath River Basin Fisheries Task Force	P.O. Box 1006	Yreka	CA	96097	530-842-5763	
Klamt	Bob	CA Regional Water Quality Control Board	5550 Skylane Boulevard	Santa Rosa	CA	95403-1064	707-576-2220	
KMUD Radio		KMUD-FM 88.3 / 91.1	P.O. Box 135	Redway	CA	95560-0135	707-923-2513	PSA's: psa@kmud.org; News: news@kmud.org; General: kmud@kmud.org;
Koch	Don	Calif. Dept. of Fish and Game	601 Locust Street	Redding	CA	96001	530-225-2363	
Kolb	John	California Dept. of Parks and Recreation North Coast Redwoods District	P.O. Box 2006	Eureka	CA	95502		jkolb@parks.ca.gov
Kreb	Mel	California Conservation Corps - Salmon Restoration Program	1500 Alamar Way	Fortuna	CA	95540	707-725-5106	mel_kreb@ccc.ca.gov, floodplain@hotmail.com
Kreb	Mel	California Conservation Corps	31117 Highway 254	Scotia	CA	95565	707-725-5105 or 725-5106	floodplain@hotmail.com
Kristin Ruger	Sam Mix and		729 1/2 Hiller	McKinleyville	CA	95519		
Kuhns	Jason		2590 Durant Avenue #249	Berkeley	CA	94705		
Land Trust Alliance		Land Trust Alliance	1319 F Street, NW, Suite 501	Washington	D.C.	20004-1106	202-638-4725	
Langlois	Jack R.	Jr Langlois And Associates	PO Box 211	Kent	CO	95452		
Larson	Chris	Mill Creek Watershed Conservancy	P.O. Box 189	Petrolia	CA	95558	707-629-3442	mrc@inreach.com
Laubscher	Bob		3171 Graybrook Lane	Hydesville	CA	95547		
Lee	Rob	B.A.C.H.	2544 Sutter	San Francisco	CA	94115		
Levie	Jeremy		5310 North Roosevelt Avenue	Fresno	CA	93704		
Lichbman	Katherine		1125 Colusa Avenue	Berkeley	CA	94707		
Lisle	Tom	U.S.F.S. PSW Redwood Sciences Lab Watershed Division	1700 Bayview Drive	Arcata	CA	95521	707-825-2930	tel7001@humboldt.edu
Loctie	Byrd	League of Women Voters	5915 Elk River Rd.	Eureka	CA	95503	707-442-7187	
Lompico Watershed Conservation		Lompico Watershed Conservation	PO Box 99	Felton	CA	95018		
Macy	Ken and Nancy		15485 Bear Creek Road	Boulder Creek	CA	95006		
Madrone	Sungnome	Natural Resources Services division of Redwood Community Action	1519 Fox Farm Road	Trinidad	CA	95570	707-269-2065 or 677-0431	sungnome@rcaa.org

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
		Agency					677-0431	
Manager and Council	City of Arcata	City of Arcata	736 F Street	Arcata	CA	95521	707-822-8184	
Manager/Director		Eureka Transit Authority	531 K Street	Eureka	CA	95501		
Marratt	Jess		PO Box 35	Plummer	ID	83851		
Marshall	John	CA Dept. of Forestry and Fire Protection	118 Fortuna Boulevard	Fortuna	CA	95540	707-725-4413	
Martello	Michael		630 Fountain Avenue	Pacific Grove	CA	93950		
Martin	Steve	NRPI Dept.	2511 Maple Ln.	Arcata	CA	95521		srm1@humboldt.edu
Mason	Paul	Environmental Protection Information Center (EPIC)	P.O. Box 397	Garberville	CA	95542	707-923-2931	paul@wildcalifornia.org or epic@wildcalifornia.org
Mattole Salmon Support Group		Mattole Salmon Group	PO Box 81	Petrolia	CA	95558-0229	707-629-3369	salmon@humboldt.net
Mattole Watershed Salmon Support		Mattole Watershed Salmon Support	P.O. Box 188	Petrolia	CA	95558	707-629-3970 or 707-629-3660	
Maurer	Janet		2815 Kenmark Rd.	Fortuna	CA	95540	707-725-9006	
Mazurek	Mary Jo		PO Box 4443	Arcata	CA	95521		
McCinty	David	City of Eureka, Community Services Dept.	531 K St.	Eureka	CA	95501	707-441-4203	
McCullough	Heidi		500 W Main	Aspen	CO	81611		
McHugh	Paul		901 Mission Street	San Francisco	CA	94103		
McKay	Tim	Northcoast Environmental Center	879 Ninth Street	Arcata	CA	95521	707-822-6918	nec@igc.org
McKinleyville Citizens Advisory Committee		McKinleyville Citizens Advisory Committee	1950 S. Gwin Road	McKinleyville	CA	95519		
McNerney	Pat		2594 Christensen Way	Eureka	CA	95501		
McReynolds	Mike		8472 Elk River Road	Eureka	CA	95503		
MCSD Recreation Committee		MCSD Recreation Committee	1933 Central Avenue	McKinleyville	CA	95519	707-839-5288	
Mendocino Environmental Center		Mendocino Environmental Center	106 W. Stanley Street	Ukiah	CA	95482	707-468-1660	mec@pacific.net
MERG		Mainstem Eel River Group (MERG)	P.O. Box 38	Alderpoint	CA	95511	707-926-1025	merg1997@yahoo.com
Merz	John B.		1331 Broadway St	Chico	CA	95928-6525		
Metz	c/o Sanctuary Forest or Tim	Upper Mattole River and Forest Cooperative	P.O. Box 1576	Redway	CA	95560		sanctuary@asis.com
Miles	Mary	Public Access To Headwaters (P.A.T.H.)	364 Page Number 36 (was 364 Pine St. #36)	San Francisco	CA	94012	415-863-2310	
Milk	Richard		2633 Third Ave.	Sacramento	CA	95818	916-227-4578	
Mill Creek Land Trust		Mill Creek Land Trust	1597 Verwer Avenue	McKinleyville	CA	95519	707-839-0727 or	

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
							839-1535	
Mills	Jeremy		455 Union Street #148	Arcata	CA	95521		
Mountain Lion Foundation		Mountain Lion Foundation	Po Box 1896	Sacramento	CA	95812		
Mueller	Patrick		1700 Se 42nd Avenue	Portland	OR	97215-3753		
Munnecke	Marchel		488 Big Lagoon Rd.	Trinidad	CA	95570		
Murguia	Liz	Office of Representative Mike Thompson	317 3rd Street, Suite 1	Eureka	CA	95501	707-269-9595	liz.murguia@mail.house.gov
Narston	Corinne		2580 Central Avenue #18	McKinleyville	CA	95519		
Nathe	Louise M.		4075 Lincoln Avenue	Oakland	CA	94602		
National Fish and Wildlife Foundation		National Fish and Wildlife Foundation_California Program Office	116 New Montgomery Street, Suite 203	San Francisco	CA	94105	415-868-2882 or 778-0999	
Natural Resources Services, RCAA		Natural Resources Services, RCAA	904 G Street	Eureka	CA	95501	707-269-2066	nrs@rcaa.org
NEAP		Northwest Economic Assistance Program (NEAP)	5630 S. Broadway	Eureka	CA	95537	707-444-9708	
Nelson	S. Kim		1865 SW Roth Street	Corvallis	OR	97333		
News Director		KIEM-TV NBC 3	5650 S. Broadway	Eureka	CA	95503	707-443-3123; 443-3933	
Nichols	Mary	The Resources Agency	1416 Ninth Street, Suite 1311	Sacramento	CA	95814	916-653-5656, 916-653-7310	
Niekrasz	Greg	Children of Humboldt	3925 F St.	Eureka	CA	99503	707-442-4268	
Noel	Cynthia		2516 Harbor View Dr.	Eureka	CA	95503	707-442-8862 or 499-4949 hm 707-441-2470 x130 wk	redwoodpost@hotmail.com
Noell	Jesse	Salmon Forever	740 E Street	Eureka	CA	95501	268-3800 (wk) or possibly 839-7552	jnoell@asis.com
Nolan	Susan	Calif Wilderness Coalition	PO Box 115	Bayside	CA	95524		
Nonem	Chris		344 Monte Vista G1	San Francisco	CA	94124		
North Coast Center for Biodiversity	Steven Day	North Coast Center for Biodiversity	PO Box 151	Leggitt	CA	95585		
Northcoast Environmental Center		Northcoast Environmental Center	879 Ninth Street	Arcata	CA	95521	707-822-6918	nec@igc.org
Northwestern University Institute	Prof. H. Paul Frieseman,	Northwestern Univ Inst	2040 Sheridan Road	Evanston	IL	60208-4100		
Nossaman	Sarah	World Stewardship Institute	409 Mendocino Avenue, Suite A	Santa Rosa	CA	95401		

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Nuth	Tara		337 14th St.	Arcata	CA	95521		moonbowmama@hotmail.com
Nystrom	Steven		805 Bush Street #310	San Francisco	CA	94108		
Oakland	Allison		PO Box 211	Blue Lake	CA	95525		
Office of Representative Thompson	Chris Chauncey,	Office of Representative Thompson	112 Hart Senate Office Building	Washington	DC	20510	202-226-7374	
Office of Senator Boxer	Sara Barth,	Office of Senator Boxer	1700 Montgomery Street, Suite 240	San Francisco	CA	94111	(202) 224-8107	
Office of Senator Chesbro	Bob Fedenburg,	Office of Senator Chesbro	3070 State Capitol	Sacramento	CA	95814	916-445-3375	
Office of Senator Feinstein	Warren Weinstein,	U.S. Senate	112 Hart Senate Office Bldg, Rm 331	Washington	D.C.	20510	202-224-5416	
Office of Senator Feinstein	Chris Norem,	Office of Senator Feinstein	525 Market Street, Suite 3670	San Francisco	CA	94105	415-536-6868	
Ono	Suehiko		1601 Shoreline Highway	Sausalito	CA	94965		
O'Grady	Debbie		1620 Longbranch Ave	Grover Beach	CA	93433		
Osterman	Sandi		1102 Synder Dr.	Davis	CA	95616		sandio@jsanet.net
Owsley	George		1302 South Main Street	Fortuna	CA	95540		
Pacific Forest Trust		Pacific Forest Trust	416 Aviation Blvd, Suite #A	Santa Rosa	CA	95403	707-578-9950	pft@pacific.net
Pacific Lumber Co.	John Campbell,	Pacific Lumber Co.	PO Box 37	Scotia	CA	95565		
Page	Nick		PO Box 28	Arcata	CA	95518		
Palmer	Neil		1020 Angel Heights Drive	Fortuna	CA	95540		
Passoff	Michael	B.A.C.H.	413 Ocean View Ave.	Kensington	CA	94707		mpassoff@igc.org
Patterson	Patti L.		393 Scenic Road	Fairfax	CA	94930		
Perreira	Chris and Pam		3620 Newburg Road	Fortuna	CA	95540		
Peterson	Peter		320 Andrew Street	Eureka	CA	95503		
Pfingstel	Jim		2208 N Street	Eureka	CA	95501		
Pickart	Andrea	U.S. Fish and Wildlife Service	6800 Lanphere Road	Arcata	CA	95521	707-822-6378	andrea_pickart@fsw.gov (bounces)
Pickett	Karen	Bay Area Coalition for Headwaters Forest	2530 San Pablo Avenue	Berkeley	CA	94702	510-835-6303	bach@igc.org
Pitek	Mike		301 Ninth Street	Fortuna	CA	95540		
Planning and Conservation League	Gary A Patton	Planning and Conservation League	926 J Street, Room 612	Sacramento	CA	95814	916-444-8276	

Table L-1. Continued

Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Point Reyes Bird Observatory		Point Reyes Bird Observatory	4990 Shoreline Hwy	Stinson Beach	CA	94970	415-868-1221	prbo@prbo.org
Pratt	L. Darlene		2211 Tenth	Berkeley	CA	94710	510-540-7198	
Rails-to-Trails Conservancy		Rails-to-Trails Conservancy	26 O'Farrell, Suite 400	San Francisco	CA	94108	415-397-2220	
Raymond	Dan And Janett		1841 Stewart Ave	Arcata	CA	95521-5022		
Reed	Mr.	McKinleyville Land Trust	PO Box 2723	McKinleyville	CA	95519	839-1535?	
Reginato	John		672 State St	Redding	CA	96001		
Reichmuth	Frank	Calif. Regional Water Quality Control Board	5550 Skylane Blvd	Santa Rosa		95403		
Reid	Dr. Leslie	U.S.F.S. PSW Redwood Sciences Lab Watershed Division	1700 Bayview Drive	Arcata	CA	95521	707-822-2933	lreid/rls_psw@fs.fed.us
Reordan	Wendy		1033 Sawyers Rd.	Eureka	CA	99503	707-476-3187	
Representative Mike Thompson	Attn: Chris Chauncey	U.S. House of Representatives	112 Hart Senate Office Bldg	Washington	D.C.	20510	202-225-3311 or 707-269-9595	m.thompson@mail.house.gov
Representative Ral Regula	Joel Kaplan,	Representative Ral Regula	2309 Rayburn House Office Building	Washington	DC	20515	202-225-3081	
Resources Committee Director	Stanley Young,	Resources Committee Director	1416 9th Street, Suite 1311	Sacramento	CA	95814	916-653-5792	
Richerson	Willie		2550 Davis Way	Arcata	CA	95521		
Rio Dell City Council		Rio Dell City Council	675 Wildwood Avenue	Rio Dell	CA	95562	707-764-3532	
Rio Dell-Scotia Chamber of Commerce		Rio Dell-Scotia Chamber of Commerce	715 Wildwood Avenue	Rio Dell	CA	95562	707-764-3436	
Roberts	Lois		200 Golden Gate	San Francisco	CA	94110		lgrobertsr@netscape.net
Roberts	Lynn	U.S. Fish and Wildlife Service	1655 Heindon Road	Arcata	CA	95521	707-822-7201	p_golightly@fws.gov
Robinson	Jeff	Humboldt Bay Harbor, Recreation, & Conservation Dist.	P.O. Box 1030	Eureka	CA	95502-1030	707-443-0801	jrobinson@portofhumboldt.org
Rogue Institute for Ecology and Economy		Rogue Institute for Ecology and Economy	P.O. Box 3213	Ashland	OR	97520	541-482-6031	
Rohde	Jerry		1901 Arthur Road	McKinleyville	CA	95519		
Rosales	Hawk	InterTribal Sinkyone Wilderness Council	PO Box 1523	Ukiah	CA	95482	707-463-6745	
Rose	Christiaan							christiaanbreeze@hotmail.com
Rose	Carol Ann		PO Box 1044	Ventura	CA	93002		
Rubach	Mary		964 Overlook Road	Berkeley	CA	94708		
Ruiz	Raul		6812 Eggert Rd.	Eureka	CA	95501	707-442-4437	
Rutter	Jennifer		1125 Colusa Avenue	Berkeley	CA	94707		

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Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Salmon Forever		Salmon Forever	1658 Ocean Drive	McKinleyville	CA	95519	707-839-7444	
Sanctuary Forest, Inc.		Sanctuary Forest, Inc.	P.O. Box 166	Whitethorn	CA	95589	707-986-1087	sanctuary@asis.com
Scanlan	Jessica Maria		545 H. St.	Arcata	CA	95521	707-825-0665	
Schafer	Ann		41 Fairview Avenue	Piedmont	CA	94610		
Senate Env. Quality Committee	Jeff Shellito,	Senate Environmental Quality Committee	State Capitol Building, Room 2203	Sacramento	CA	95814	916-324-0894	
Senior News		Senior News	1910 California Street	Eureka	CA	95501	707-443-9747	srnews@northcoast.com
Shahbandi	K.		1716 N St. #11	Sacramento	CA	95814	916-443-4337	
Shelter Cove Resort Improvement District		Shelter Cove Resort Improvement District	9126 Shelter Cove Road	Whitethorn	CA	95589		
Siekmann	Robert		3703 Renner Drive	Fortuna	CA	95540		
Siekmann	Suzannah		3703 Renner Drive	Fortuna	CA	95540-3110		
Sierra Club		Sierra Club	3200 Greenwood Heights Drive	Kneeland	CA	95549	707-445-2690	
Sierra Pacific Industries	Ron Hoover,	Sierra Pacific Industries	P.O.Box 1189	Arcata	CA	95518	707-443-3111	
Sierra Pacific Industries	Tom Engstrom,	Sierra Pacific Industries	PO Box 496014	Redding	CA	96049-6014		
Simon	Donald S.	B.A.C.H.	2249 Sutter Street	San Francisco	CA	94115		dsimon@mindspring.com
Simpson Timber Company	Theron O'dell,	Simpson Timber Company	P.O. Box 68	Korbel	CA	95550	707-668-4500	
Smith	Dr. Mike	HSU Dept. of Natural Resources	Humboldt State University	Arcata	CA	95521	707-826-4291	mds7001@humboldt.edu
Smith River Alliance	Sandra Jerabek	Smith River Alliance	PO Box 2129	Crescent City	CA	95531		soar@cc.northcoast.com
Spandle	Pat		80 Wilder Road	Carlotta	CA	95528		
Speelman	Brian and Tracy		PO Box 11	Phillipsville	CA	95559		
Stein	Lyn		513 Bush Street #34	San Francisco	CA	94108		
Stemler	Randy	Mattole Restoration Council	135 Gross Street	Fieldbrook	CA	95519	707-839-2242; cell ph: 707-834-4222	rstemler@inreach.com
Stilwell	Glenn	International Mountain Biking Association (IMBA)	8607 Carlin Ave.	Sacramento	CA	95823	916-391-9846	glenn@radioplac.com
Stone	Lois	League of Women Voters	P.O. Box 992	Blue Lake	CA	95525	707-668-5783	
Stone Lagoon Action Committee		Stone Lagoon Action Committee	1976 Archer Road	McKinleyville	CA	95519	707-839-1056	
Strauss	Art		187 Acton Road	Columbus	OH	43214-3303		
Strom-Martin, Assemblywoman	Virginia	California State Assembly	Room 3146 State Capitol Building	Sacramento	CA	95814	707-445-7014, 916-445-8360, 916-319-2001	

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Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Sturgill	Amy		7101 Langworths	OAKDALE	CA	95361		
Szaro	Tim		1955 OÖFarrell	San Francisco	CA	94115		
Tanferani	Joyce		PO Box 297	Loleta	CA	95551		
Taxpayers for Headwaters		Taxpayers for Headwaters	P.O. Box 402	Arcata	CA	95518	707-444-3906 or 445-0565	
Taylor	Ellen		P.O. Box 60	Petrolia	CA	95558	707-629-3500	
Thron	Doug		PO Box 703	Arcata	CA	95521		
Thurston	Candace		3203 Y St.	Sacramento	CA	95817	916+456-8633	
Tilles	c/o Sandy	Coastal Headwaters Association	P.O. Box 271	Whitethorn	CA	95589		
Tout	Nancy		2845 Essex Street	Eureka	CA	95501		
Travel Impulse Magazine	Susan Boyce,	Travel Impulse Magazine	9336 117th St.	Delta, IBC	Canada	V4C6B8		
TREES Foundation		TREES Foundation	PO Box 1850	Redway	CA	95560		
Trinidad Chamber of Commerce		Trinidad Chamber of Commerce		Trinidad	CA	95570	707-441-9827	
Trinidad City Council		Trinidad City Council	409 Trinity Avenue	Trinidad	CA	95570	707-677-0223	
Trinity County Board Of Supervisors		Trinity County Board Of Supervisors	PO Drawer 1613	Weaverville	CA	96093		
Trinity County Board Of Supervisors		Trinity County Board Of Supervisors	PO Drawer 1613	Weaverville	CA	96093		
U.S. Fish and Wildlife Service		U.S. Fish and Wildlife Service Northern California Office	2800 Cottage Way, Suite W-2605	Sacramento	CA	95825	916-979-2110	
U.S. Forest Service Six Rivers NatÖl Forest	S.E. ÒLouÓ Woltering,	Six Rivers National Forest	1330 Bayshore Way	Eureka	CA	95501	707-442-1721	lwoltering@fs.fed.us
U.S. National Park Service_Redwood National Park	Andrew T. Ringgold,	U.S. National Park Service_Redwood National Park	111 Second Street	Crescent City	CA	95531	707-464-6101	
Upper Eel Watershed Forum		Upper Eel Watershed Forum	P.O. Box 701	Covelo	CA	95428		
Upton	Chuck and Joann		3800 Newburg Rd.	Fortuna	CA	95540		
Van Vleet	Erik		PO Box 215	Loleta	CA	95551		
VanBrocklin	David	B.A.C.H.	1915 Humboldt Ave.	Davis	CA	94115	530-753-2648	
Vander	Carol	Friends of the Dunes	P.O. Box 186	Arcata	CA	95518	707-444-1397 or 268-0334	
Walsh	Dave	Ancient Forest International	PO Box 1850	Redway	CA	95560	707-923-3015	
Waltenspiel	Ruth		4791 Dry Creek Road	Healdsburg	CA	95448		
Warner	Eric		5501 Keoncrest Circle Apt 5	Sacramento	CA	95841		
Watershed Research and		Watershed Research and Training	P.O. Box 356	Hayfork	CA	96041	530-628-4983 or	

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Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
Training Center		Center					628-5345	
Weare	Robin M.		5654 Sidney Avenue	Long Beach	CA	90805		
Wechsler	Gail		221 San Jose Ave. #5	San Francisco	CA	94110		
Welsh	Hart	U.S.F.S. PSW Redwood Sciences Lab Wildlife Division	1700 Bayview Drive	Arcata	CA	95521	707-825-2956	hwelsh@fs.fed.us
Werner	Susan		1509 Ada Street	Berkeley	CA	94703		
Wheetley	Mark	California Dept. of Fish and Game	619 Second Street	Eureka	CA	95501	707-441-5829 (wk) 825-8836 (hm)	wk: mwheetley@dfg.ca.gov home:_wheetley@humbo ldt1.com
Wheetley	Mark	The Resources Agency CERT Team	1416 Ninth Street, Suite 1311	Sacramento	CA	95814	916-653-5672	
White,	Dr. Steven	Dept Of Biological Sciences	San Jose State University	San Jose	CA	95192		
Wilbur	Ken	California State Parks	PO Box 2006	Eureka	CA	95502	707-445-6547 x14	
Wildlife Conservation Board	Jim Sarro		1807 13th Street, Suite 103	Sacramento	CA	95814		
Williamson	Cynthia Ann		8844 Placer Rd	Redding	CA	96001		
Willingham	Erik	KINS 980 AM	1101 Marsh Rd.	Eureka	CA	95501	707-442-4377	
Wilson	Brian		PO Box 7428	Cotati	CA	94931-7428		
Wilson	Jason		PO Box 748	Bayside	CA	95524		
Wilson	Charles		PO Box 127	Orick	CA	95555	707-488-3025	
Wood	Lea		104 Maple Leaf Road	Underhill	VT	5489		
Worley	Norman		6018 Walnut Drive	Eureka	CA	95503-6753		
Wrigley	Kristi		7968 Elk River Road	Eureka	CA	95503	707-443-1496	
Yoon	Paula	Redwood Creek National Watershed Center	1636 Old Arcata Rd.	Bayside	CA	95524	707-822-3577	pfyoon@sprintmail.com
Yoon	Paula	Redwood Creek National Watershed Center	PO Box 145	Orick	CA	95555	707-822-3577	pfyoon@sprintmail.com
Ziemer	Robert	U.S.F.S. PSW Redwood Sciences Lab Watershed Division	1700 Bayview Drive	Arcata	CA	95521	707-822-3691	rrz7001@humboldt.edu
		Trust for Public land	116 New Montgomery Street, 3rd Floor	San Francisco	CA	94105	415-495-5660	
		Headwaters Sanctuary Project	1904 Franklin Street, Suite 909	Oakland	CA	94612		
		CA Regional Water Quality Control Board	5550 Skylane Boulevard, Suite A	Santa Rosa	CA	95403	707-576-2220 or 576-2682	

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Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
	Jenny	Mendocino Land Trust	P.O. Box 1472	Mendocino	CA	95460	707-962-0470	mlt@mcn.org
		Humboldt County Library	1313 Third Street	Eureka	CA	95501	707-269-1900	
		Humboldt County Planning Commission	3015 H Street	Eureka	CA	95501	707-445-7541	
		Salmon and Steelhead Recovery Coalition	1426 8th Street	Eureka	CA	95501	707-444-8903	
		McKinleyville Citizens Advisory Committee	3015 H Street	Eureka	CA	95501	707-445-7541 or 445-0269	
		Salmon Trollers Advisory Committee Commercial Salmon Stamp	6367 Purdue Drive	Eureka	CA	95501	707-443-0108	
		Eureka Assistant City Manager	531 K Street	Eureka	CA	95501	707-441-4172	
		Backcountry Horsemen Association	PO Box 6023	Eureka	CA	95502		
		Humboldt Community Access and Resource Center (HCAR)	P.O. Box 2010	Eureka	CA	95502	707-443-7077 or 445-8419	
		League of Women Voters	P.O. Box 3219	Eureka	CA	95502	707-444-9252	
		CA Dept. of Transportation	P.O. Box 3700	Eureka	CA	95502	707-445-6600	
		Keep Eureka Beautiful	2020 Fern Street	Eureka	CA	95503	707-443-9195	
		Elk River Residents Association	2550 Wrigley Road	Eureka	CA	95503	707-443-1496	
		American Fisheries Society Humboldt Chapter	P.O. Box 210	Arcata	CA	95518	707-826-3268 or 822-6089	
		Beach and Dune Stewards	P.O. Box 735	Arcata	CA	95518	707-443-1985	
		CEED	P.O. Box 4167	Arcata	CA	95518	707-822-8347	
		Friends of the Arcata Marsh	P.O. Box 410	Arcata	CA	95518	707-826-2359 or 839-4253	none
		Humboldt Surfriders Foundation	P.O. Box 4605	Arcata	CA	95518	707-445-1336 or 445-6098	
		MCSD Board	P.O. Box 2037	McKinleyville	CA	95519		
		Arcata Marsh and Wildlife Sanctuary	569 Lower G Street	Arcata	CA	95521	707-826-2359	
		Redwood Empire Endurance Riders	1578 Fickle Hill Rd.	Arcata	CA	95521	707-822-9430	
		Arcata Main Street	850 G Street, Suite D	Arcata	CA	95521		
		Pacific Marine Conservation Council	332 9th Street, Apt. B	Arcata	CA	95521	707-822-4424	
		A&MRTS	736 F Street	Arcata	CA	95521		
		City of Arcata Environmental Services	736 F Street	Arcata	CA	95521	707-825-2154	
		Manila Community Services District	1901 Park Street	Manila	CA	95521	707-445-3309	
		Humboldt Area Foundation	P.O. Box 99	Bayside	CA	95524	707-442-2993	

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Last Name	First Name	Organization Name	Address	City	State	Zip	Phone	Email
		Institute of the North Coast	P.O. Box 99	Bayside	CA	95524	707-442-2993	
		City of Blue Lake	P.O. Box 458	Blue Lake	CA	95525	707-668-5655	
		Ferndale City Council	P.O. Box 1095	Ferndale	CA	95536	707-786-4224	
		Humboldt Bay Forest Products	P.O. Box 266	Fields Landing	CA	95537	707-443-5631	
		AmeriCorps Watershed Stewards	1455 C Sandy Prairie Ct.	Fortuna	CA	95540	707-725-8601	fishhelp@northcoast.com
		Mattole Restoration Council	P.O. Box 160	Petrolia	CA	95558	707-629-3609 or 629-3514	mrc@inreach.com
		Institute for Sustainable Forestry	P.O. Box 1580	Redway	CA	95560	707-247-1101	isf@isf-sw.org
		City of Trinidad, City Manager	409 Trinity Avenue	Trinidad	CA	95570	707-677-0223	

Appendix M. Index

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